FCC PART 15.247

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R.China 610045

Tested Model: VT-M2M-BTA-DE-A
FCC ID: 2AAGEBTADE-ALP

Report Type:	**Product Name:**
Original Report	Gateway

Report Number:	RSC200305002-0C
Date of Report Issue:	2020-05-11
Reviewed By:	Sula Huang
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Chengdu Vantron Technology, Ltd.
Product	Gateway
Tested Model	VT-M2M-BTA-DE-A
Multiple Model	VT-M2M-BTA-DE-ALP
FCC ID	2AAGEBTADE-ALP
Radio Mode	Wi-Fi; Bluetooth LE
Frequency	Wi-Fi: 2412-2462MHz (802.11b/g/n20), 2422-2452MHz (802.11n40) Bluetooth LE: 2402-2480MHz
Modulation Type:	802.11b: DSSS 802.11g/n20/n40: OFDM Bluetooth LE: GFSK
Voltage Range	DC 9-36V(Typical: 12V) from adapter
Measure approximately	176 mm (L) x 101 mm (W) x 52 mm (H)
Sample serial number	200305002/01 (assigned by the BACL, Chengdu)
Sample/EUT Status	The test sample was in good condition and received: 2020-03-05
Adapter	Manufacturer: Shenzhen Wentong Electronic Co., Ltd Model : WT1205000 Voltage Input: AC 100-240V 50/60Hz 1.6A Voltage Output: DC 12V 5.0A

Note: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Base on difference between VT-M2M-BTA-DE-A and VT-M2M-BTA-DE-ALP, full items was performed for the former, only radiated emissions(30 MHz-1 GHz) for the latter.

Objective

This report is prepared on behalf of **Chengdu Vantron Technology, Ltd.** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: 2AAGEBTADE-ALP

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.24 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.47 dB
		V	4.73 dB
	200MHz-1GHz	H	4.87 dB
		V	5.93 dB
	1GHz-6GHz		4.74 dB
	6GHz-18GHz		4.76 dB
	18GHz-40GHz		5.44 dB
RF output power, conducted			±0.61 dB
Occupied Bandwidth			±5 %
Power Spectrum Density, conducted			±2.5 dB
Humidity			±5 %
Temperature			±1 ℃
Voltage(DC)			±0.4 %
Voltage(AC,<10kHz)			±1 %
Time			±1 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v05r02.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured in testing mode, which was provided by manufacturer.

For Wi-Fi mode, 802.11b, 802.11g, and 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	-	-

EUT were tested with Channel 1, 6 and 11.

For 802.11n-HT40 mode, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437	-	-

802.11n HT40 was tested with Channel 3, 6 and 9.

For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
..	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

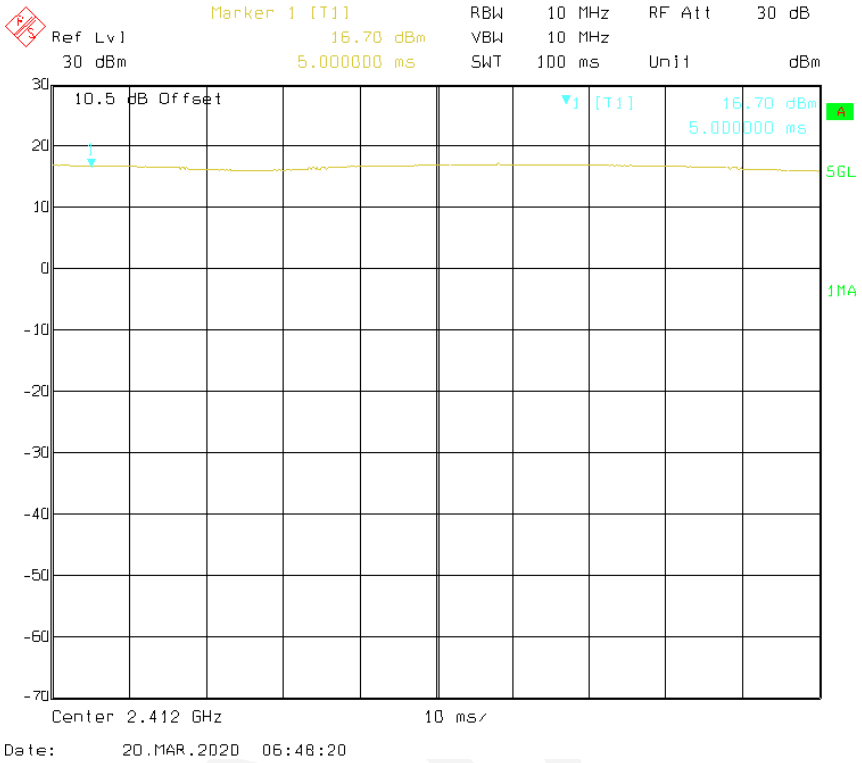
The setting by the software built-in the device as following table:

Test Mode	Test Software Version	rtwpriv		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level	Default	Default	Default
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level	Default	Default	Default
802.11n-HT20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level	Default	Default	Default
802.11n-HT40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level	Default	Default	Default
BLE 1M	Test Frequency	2402MHz	2440MHz	2480MHz
	Data Rate	Default	Default	Default
	Power Level	Default	Default	Default

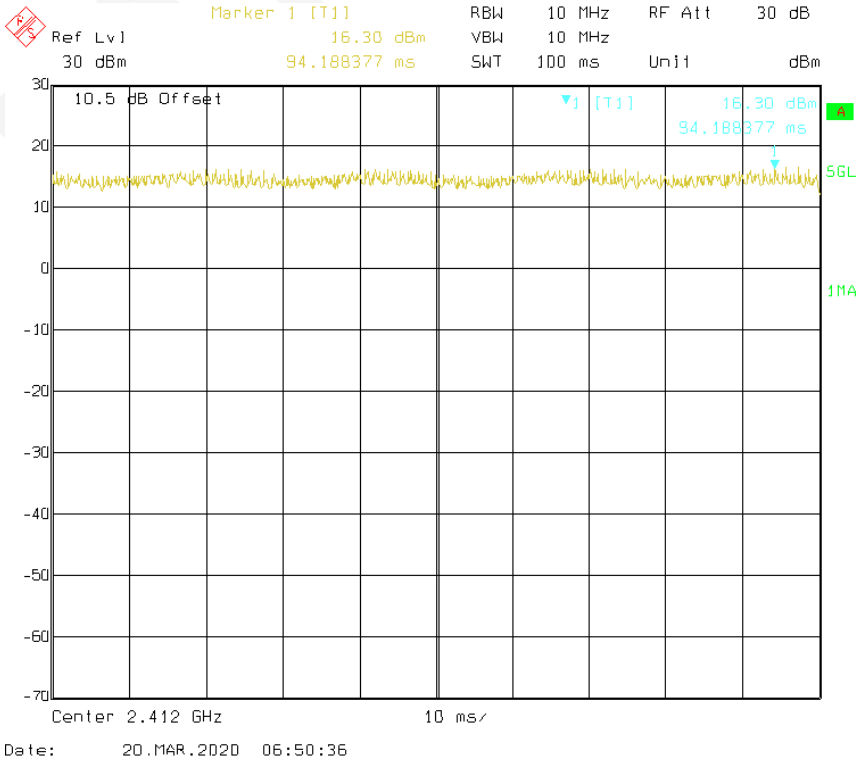
Duty Cycle information is below:

Mode	T_{on} (ms)	T_p (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)
802.11b	-	-	100	-
802.11g	-	-	100	-
802.11n-HT20	-	-	100	-
802.11n-HT0	-	-	100	-
BLE 1M	0.39	0.62	62.9	2.07

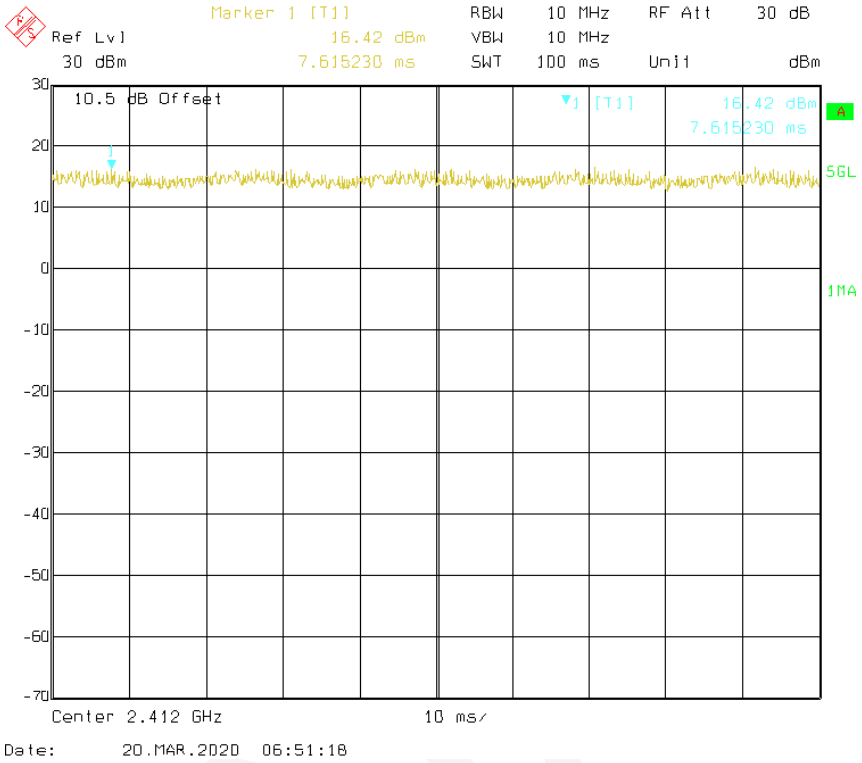
802.11b



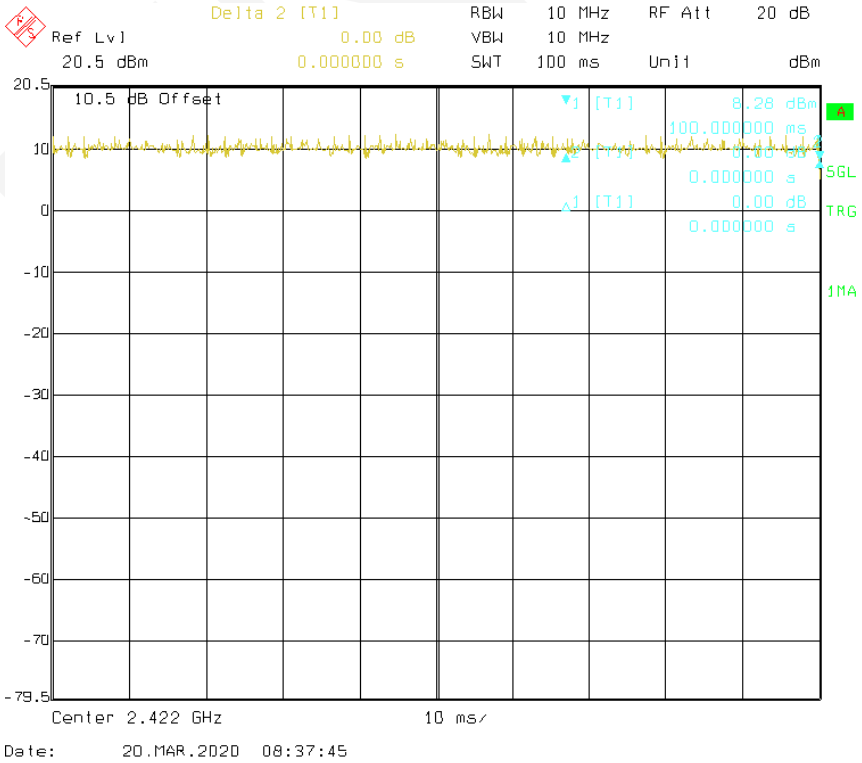
802.11g



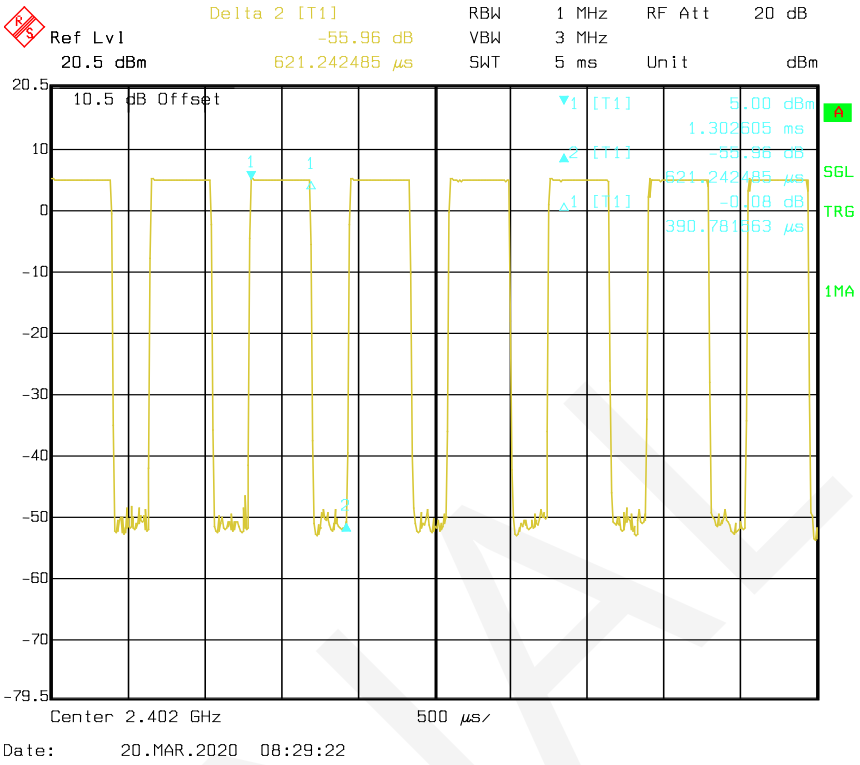
802.11n-HT20



802.11n-HT40



BLE 1M mode


Delta 2 [T1]
-55.96 dB
621.242485 µs
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm
Ref Lvl
20.5 dBm
10.5 dB Offset
1 [T1] 5.00 dBm
1.302605 ms
2 [T1] -55.96 dB
621.242485 µs
Δ1 [T1] -0.08 dB
390.781963 µs
A
SGL
TRG
1MA
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.402 GHz
500 µs/
Date: 20.MAR.2020 08:29:22

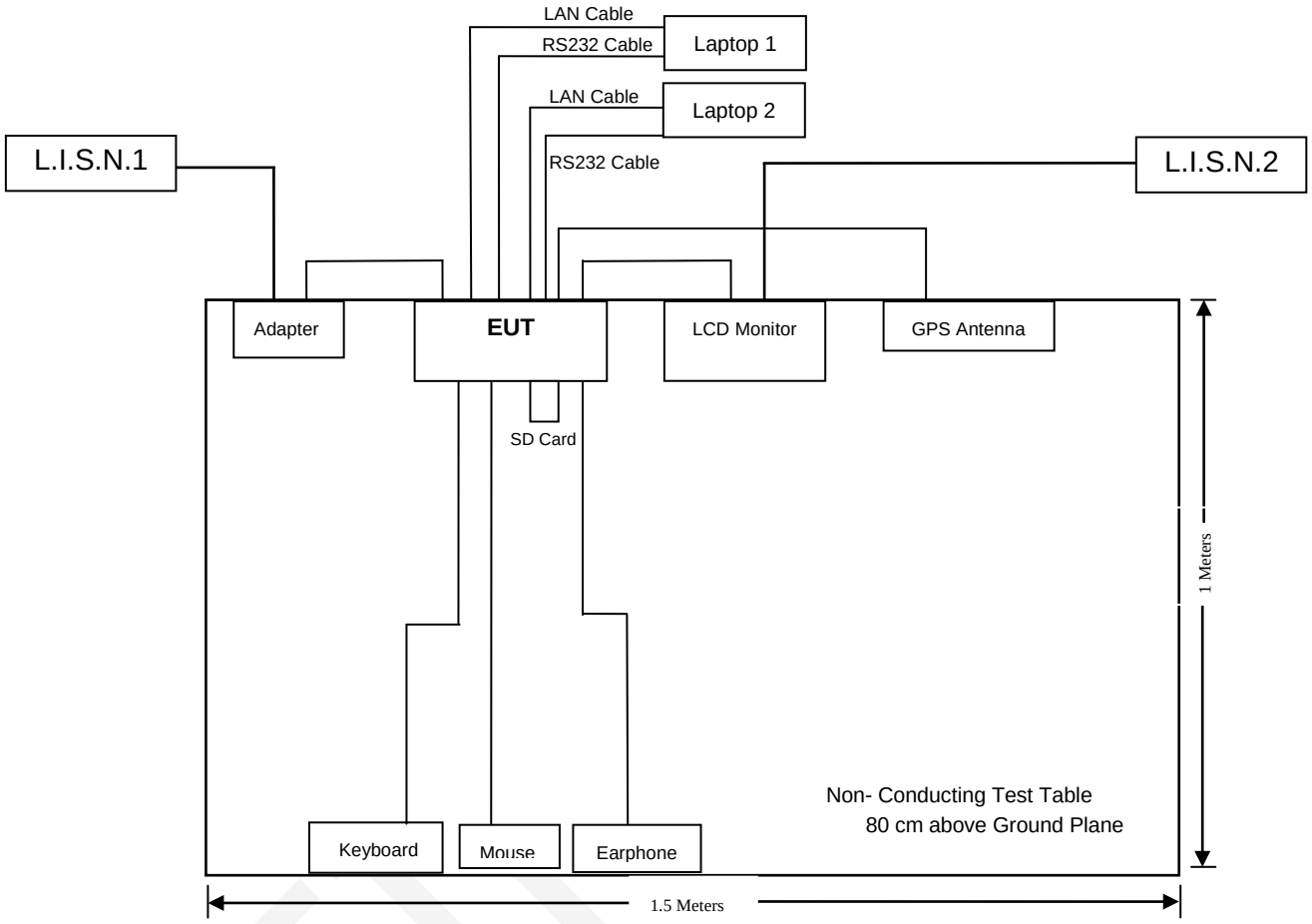
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
EDIFIER	Earphone	K800	Unknown
DELL	LCD Monitor	E157FPb	Unknown
DELL	Laptop 1	E6410	42159296809
DELL	Laptop 2	PP01L	3F438A01
Lenovo	Keyboard	SK-8821	Unknown
ACER	Mouse	M113	Unknown
SanDisk	SD Card	16GB	Unknown

External I/O Cable

Cable Description	Length (m)	From	To
Unshielded AC Power Cable	1.5	Adapter	L.I.S.N.1
Unshielded AC Power Cable	1.5	LCD Monitor	L.I.S.N.2
Shielded VGA Cable	1.8	EUT	LCD Monitor
Unshielded LAN Cable	8.0	EUT	Laptop 1
Shielded RS232 Cable x 2	8.0	EUT	Laptop 1 Laptop 2
Unshielded LAN Cable	8.0	EUT	Laptop 2
Unshielded Keyboard Cable	1.8	Keyboard	EUT
Unshielded Mouse Cable	1.8	Mouse	EUT
Unshielded Earphone Cable	2.0	Earphone	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 & §1.1310 & §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum conducted output power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2019-04-15	2020-04-14
ROHDE&SCHWARZ	L.I.S.N.	ENV216	3560.6550.16	2020-01-13	2021-01-12
EMCO	L.I.S.N.	3810/2BR	9509-1102	NCR	NCR
HP	RF Limiter	11947A	3107A01270	2019-10-18	2020-10-17
Micro-coax	Conducted Cable	L-E003	000003	2019-08-05	2020-08-04
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	NCR	NCR
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2022-05-17
SONOMA INSTRUMENT	Amplifier	310 N	186684	2019-09-06	2020-09-05
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2019-12-10	2022-12-09
INMET	Attenuator	18N-6dB	N/A	2019-10-17	2020-10-16
Rohde & Schwarz	EMI Test Receiver	ESR3	102456	2019-04-15	2020-04-14
Rohde & Schwarz	Spectrum Analyzer	FSU26	200835	2019-04-15	2020-04-14
Rohde & Schwarz	EMI Test Receiver	ESIB 40	100215	2019-04-15	2020-04-14
EMCO	Horn Antenna	3115	2192	2019-09-25	2021-09-24
Mini-circuits	Pre-Amplifier	ZVA-183-S+	771001215	2019-09-20	2020-09-19
EM Electronics	Pre-Amplifier	EM18G40	060725	2019-07-24	2020-07-23
A.H. Systems, Inc	Horn Antenna	SAS-574	510	2019-09-02	2021-09-01
MICRO-TRONICS	2.4GHz Notch Filter	BRM50702	G396	2020-02-22	2021-02-21
Unknown	RF Cable (Below 1GHz)	L-E005	000005	2019-09-06	2020-09-05
Unknown	RF Cable (Below 1GHz)	T-E128	000128	2019-10-17	2020-10-16
Unknown	RF Cable (Below 1GHz)	T-E237	233522-001	2019-07-19	2020-07-18
Unknown	RF Cable (Above 1GHz)	T-E069	000069	2019-07-24	2020-07-23
UTiFLEX	RF Cable (Above 1GHz)	T-E222	2551/2	2019-07-24	2020-07-23
UTiFLEX	RF Cable (Above 1GHz)	T-E210	1042	2019-07-24	2020-07-23
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2019-04-15	2020-04-14
Agilent	USB power sensor	U2021XA	MY53320008	2020-01-13	2021-01-12
WEINSCHEL ENGINEERING	Attenuator	1A 10dB	AB1165	2019-08-05	2020-08-04
RF Superstore	DC Block	RF-530004	Unknown	2019-08-05	2020-08-04
Unknown	RF Cable	Unknown	000007	Each Time	Each Time

FCC §15.247 & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE

Applicable Standard

According to subpart 15.247 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	※(100)	30
1.34–30	824/f	2.19/f	※(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; ※ = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Per 447498 D01 General RF Exposure Guidance v06**,** simultaneous transmission MPE test exclusion applies when the sum of the MPE for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.
Calculated Formulary:

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:
S = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

Calculated Data:

WiFi +Bluetooth + Zigbee module (FCC ID: QOQMGM12P3，Date of Grant: 2017-08-01) + WCDMA/LTE module (FCC ID: RI7LE910NAV2, Date of Grant: 2016-07-06)

MPE evaluation for single transmission:

Raido Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
WLAN	2412-2462	2.0	1.58	16.0	39.81	20	0.013	1.0	0.013
Zigbee	2405-2480	2.0	1.58	19.0	79.43	20	0.025	1.0	0.025
LE 1M	2402-2480	2.0	1.58	8.0	6.31	20	0.002	1.0	0.002
BT 3.0	2402-2480	2.0	1.58	7.5	5.62	20	0.002	1.0	0.002
WCDMA Band 5	824-849	3.0	2.00	24.5	281.84	20	0.112	0.55	0.204
LTE Band 5	824-849	3.0	2.00	24.0	251.19	20	0.100	0.55	0.182
WCDMA Band 2	1850-1910	5.0	3.16	24.5	281.84	20	0.177	1.0	0.177
LTE Band 2	1850-1910	5.0	3.16	24.0	251.19	20	0.158	1.0	0.158
LTE Band 4	1710-1755	5.0	3.16	24.0	251.19	20	0.158	1.0	0.158
LTE Band 12	699-716	3.0	2.00	24.0	251.19	20	0.100	0.47	0.213
LTE Band 13	777-787	3.0	2.00	24.0	251.19	20	0.100	0.52	0.192
LTE Band 17	704-716	3.0	2.00	24.0	251.19	20	0.100	0.47	0.213

MPE evaluation for simultaneous transmission:

Note: Wi-Fi, Bluetooth, Zigbee&WCDMA/LTE can transmit simultaneously, MPE evaluation is as below formula:

PD1/Limit1+PD2/Limit2+……＜1, PD (Power Density)

The worst case is as below:

MPE of WLAN + MPE of Bluetooth +MPE of Zigbee + MPE of WWAN
= 0.013/1.0+0.002/1.0+0.025/1.0+0.10/0.47=0.252＜1.0

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has one Wi-Fi antenna, one Bluetooth antenna, one Zigbee antenna, one LTE main antenna, one LTE diversity antenna and one GPS antenna, which fulfill the requirement of this section. Please refer to the table below and EUT photos.

Mode	Manufacturer	Model Number	Antenna Gain (Max)	Impedance (Ohm)	Antenna Connector	Antenna Type
Wi-Fi	Dongguan YiJia Electronics Communication Technology Co.,Ltd.	YJ042S.100001.S02	2.0dBi	50	Reverse SMA male	Monopole
Bluetooth	Dongguan YiJia Electronics Communication Technology Co.,Ltd.	YJ042S.100001.S02	2.0dBi	50	Reverse SMA male	Monopole
Zigbee	FULL RISE ELECTRONIC CO.,LTD	AN-AI-XOC	2.0dBi	50	Reverse SMA male	Monopole
LTE Main	Asian Creation	AC-Q7027-YZW	3.0 dBi (698-960MHz) 5.0 dBi (1710-2700MHz)	50	SMA(Male)	Monopole
LTE Diversity	Asian Creation	AC-Q7027-YZW	3.0 dBi (698-960MHz) 5.0 dBi (1710-2700MHz)	50	SMA(Male)	Monopole
GPS	Shenzhen Norminson Technology CO., LTD.	NP002	28dBi	50	SMA(Male)	Monopole

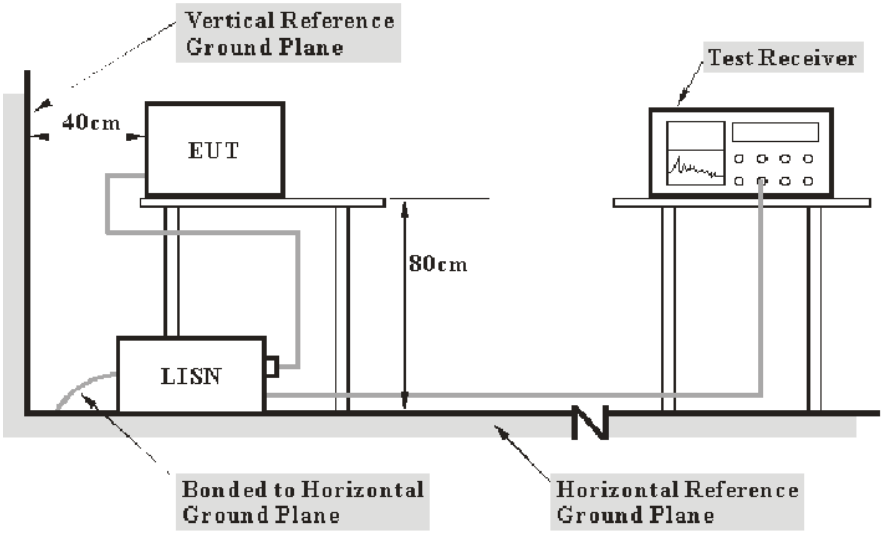
Result: Compliance

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first L.I.S.N.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Test Environment Conditions

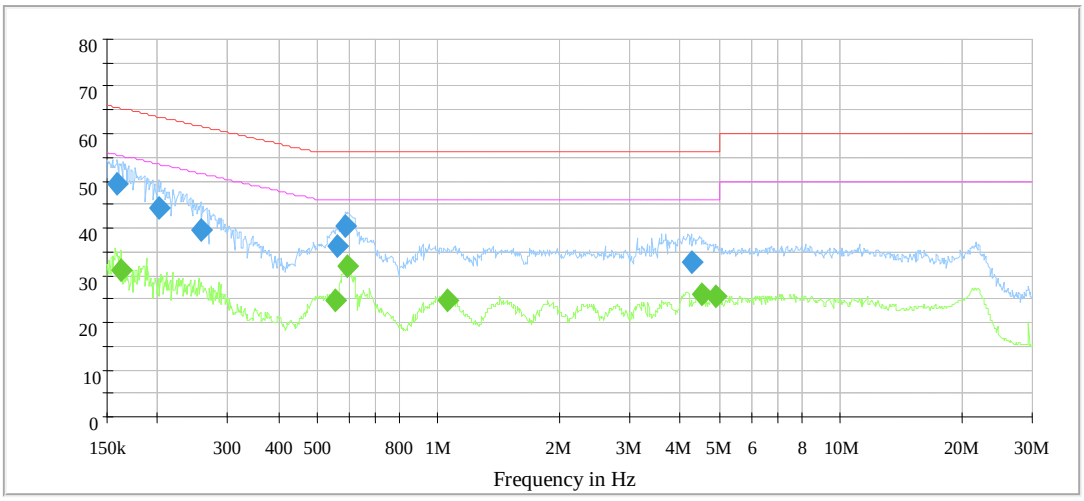
Temperature:	21 °C
Relative Humidity:	40 %
ATM Pressure:	95.9 kPa

The testing was performed by Tian Maofan on 2020-03-19.

Test Mode: Transmitting

Wi-Fi Mode: (802.11g Low Channel)-Worst Case

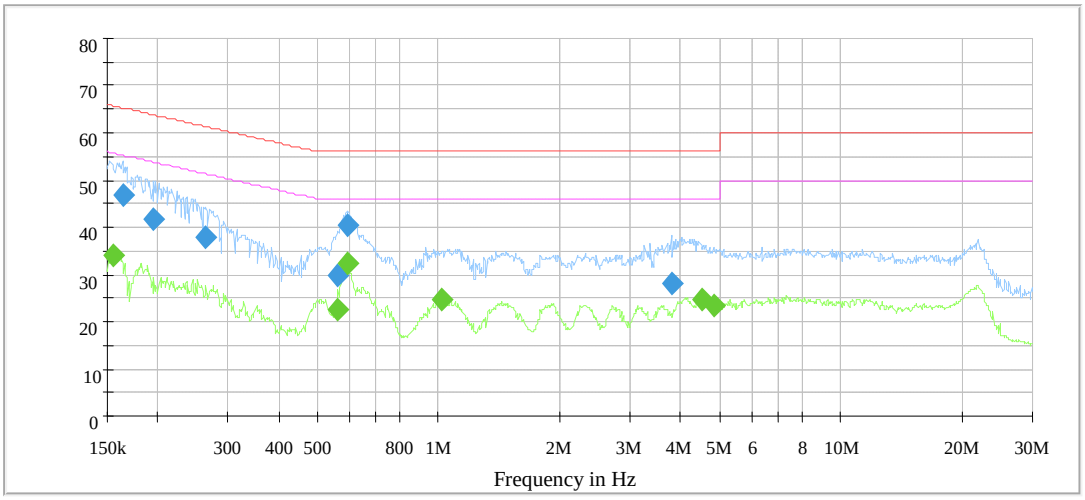
AC120V/60Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159252	49.3	9.000	L1	19.6	16.2	65.5
0.201321	44.3	9.000	L1	19.8	19.3	63.6
0.255776	39.6	9.000	L1	19.8	22.0	61.6
0.562468	36.0	9.000	L1	19.8	20.0	56.0
0.588291	40.4	9.000	L1	19.8	15.6	56.0
4.261073	32.6	9.000	L1	19.7	23.4	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163273	31.2	9.000	L1	19.6	24.1	55.3
0.556885	24.5	9.000	L1	19.8	21.5	46.0
0.597160	32.0	9.000	L1	19.8	14.0	46.0
1.059712	24.8	9.000	L1	19.8	21.2	46.0
4.501380	25.9	9.000	L1	19.7	20.1	46.0
4.899691	25.4	9.000	L1	19.7	20.6	46.0

AC120V/60Hz,Neutral:

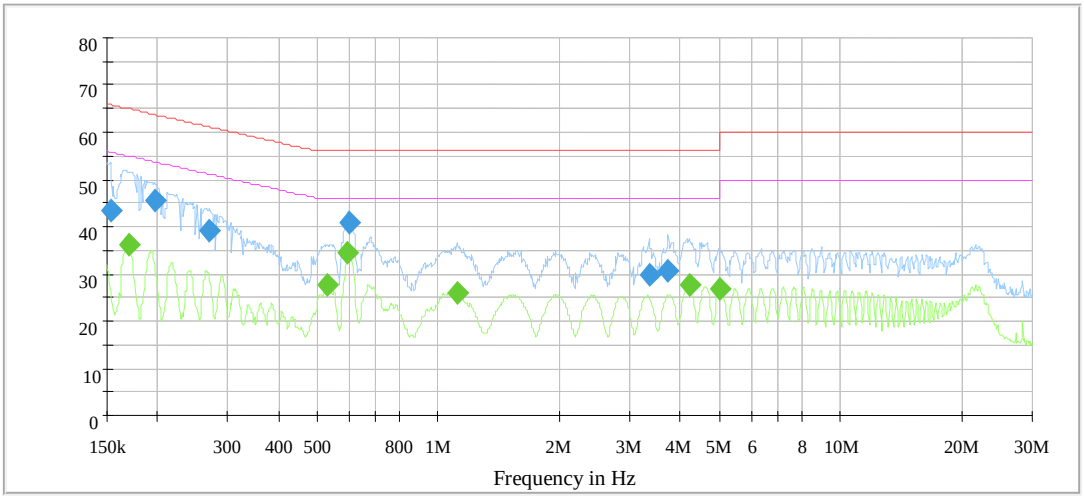


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.164089	46.9	9.000	N	19.6	18.4	65.3
0.196363	41.7	9.000	N	19.7	22.1	63.8
0.263546	37.9	9.000	N	19.8	23.4	61.3
0.562468	29.7	9.000	N	19.8	26.3	56.0
0.597160	40.3	9.000	N	19.8	15.7	56.0
3.799265	28.2	9.000	N	19.7	27.8	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.155330	34.2	9.000	N	19.6	21.5	55.7
0.562468	22.6	9.000	N	19.8	23.4	46.0
0.591233	32.2	9.000	N	19.8	13.8	46.0
1.023353	24.7	9.000	N	19.8	21.3	46.0
4.523887	24.6	9.000	N	19.7	21.4	46.0
4.851059	23.5	9.000	N	19.7	22.5	46.0

LE 1M Mode: (Low channel)-worst case

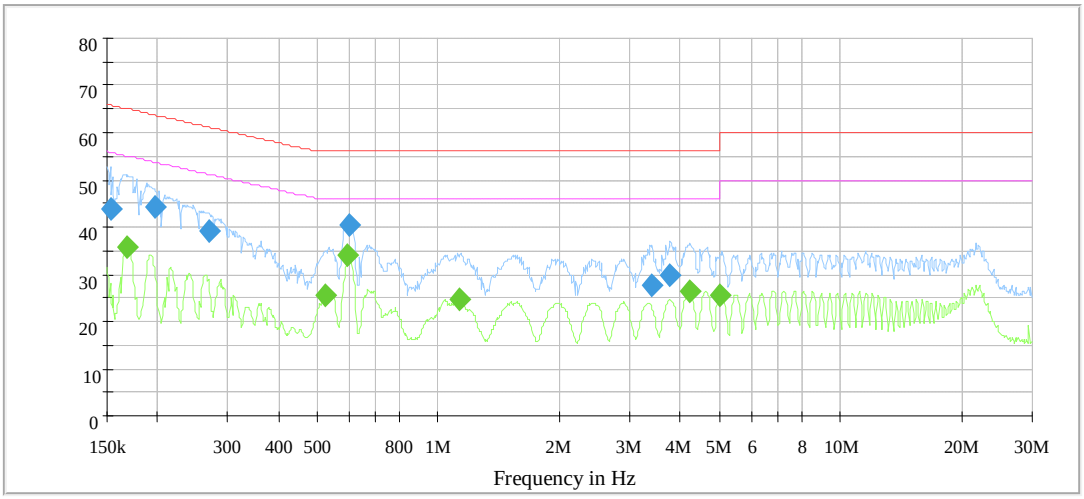
AC120V/60Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.153023	43.4	9.000	L1	19.5	22.4	65.8
0.197344	45.4	9.000	L1	19.8	18.3	63.7
0.270201	39.2	9.000	L1	19.8	21.9	61.1
0.600146	41.0	9.000	L1	19.8	15.0	56.0
3.337198	29.9	9.000	L1	19.7	26.1	56.0
3.724220	30.7	9.000	L1	19.7	25.3	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.169919	36.1	9.000	L1	19.6	18.9	55.0
0.529792	27.7	9.000	L1	19.8	18.3	46.0
0.597160	34.5	9.000	L1	19.8	11.5	46.0
1.119475	25.9	9.000	L1	19.8	20.1	46.0
4.197791	27.5	9.000	L1	19.7	18.5	46.0
4.998423	26.8	9.000	L1	19.7	19.2	46.0

AC120V/60Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.153023	43.8	200.0	9.000	N	19.6	22.0	65.8
0.197344	44.3	200.0	9.000	N	19.7	19.4	63.7
0.268857	39.1	200.0	9.000	N	19.8	22.1	61.2
0.600146	40.3	200.0	9.000	N	19.8	15.7	56.0
3.404444	27.7	200.0	9.000	N	19.7	28.3	56.0
3.780363	30.0	200.0	9.000	N	19.7	26.0	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168233	35.9	200.0	9.000	N	19.6	19.1	55.0
0.521924	25.6	200.0	9.000	N	19.8	20.4	46.0
0.597160	34.0	200.0	9.000	N	19.8	12.0	46.0
1.130698	24.6	200.0	9.000	N	19.8	21.4	46.0
4.197791	26.4	200.0	9.000	N	19.7	19.6	46.0
4.998423	25.5	200.0	9.000	N	19.7	20.5	46.0

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

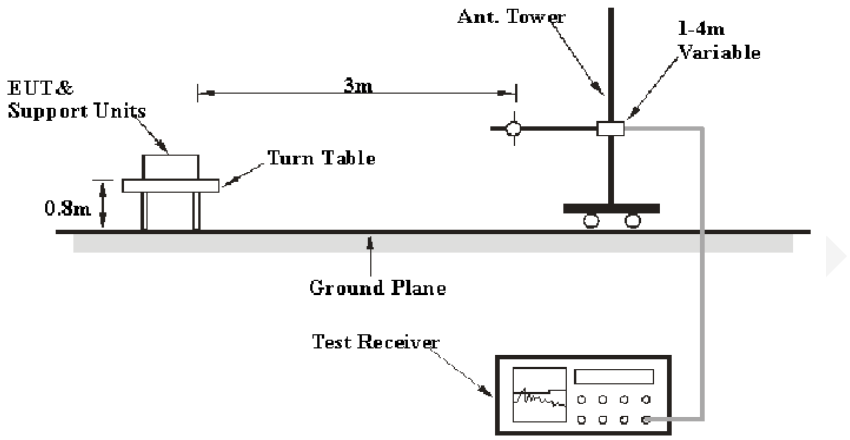
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

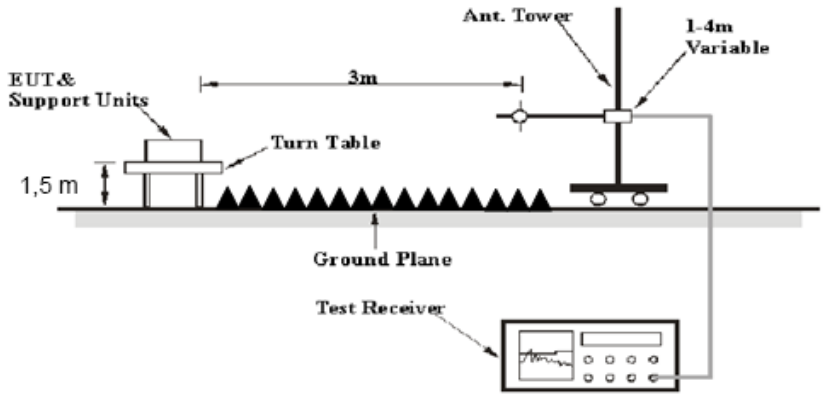
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Data

Test Environment Conditions

Temperature:	25 °C
Relative Humidity:	62 %
ATM Pressure:	95.1 kPa

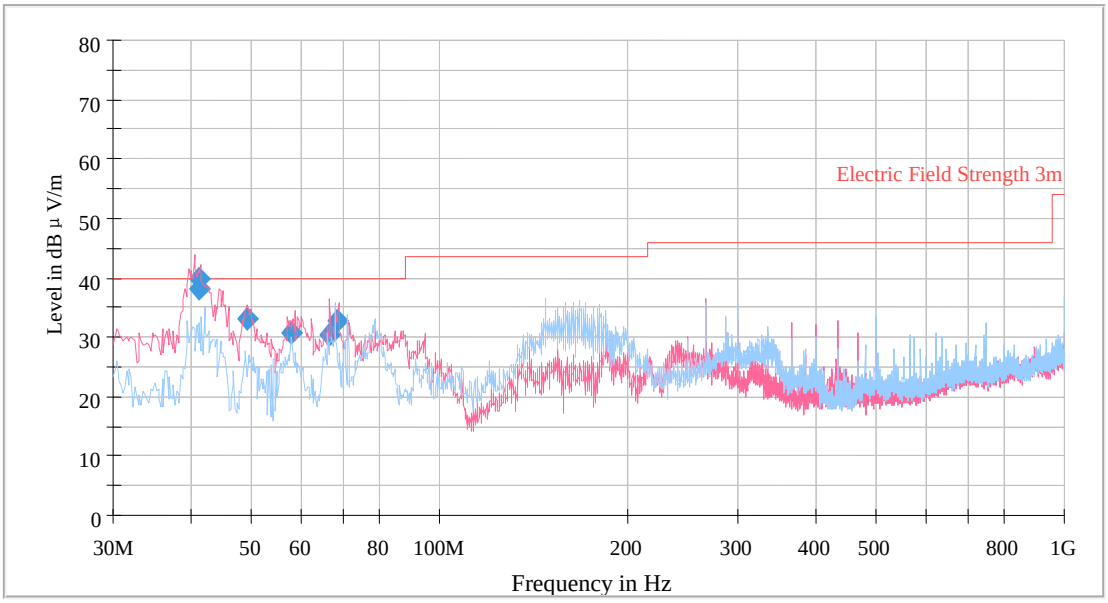
The testing was performed by Tian Maofan on 2020-03-23.

Test Mode: Transmitting

Wi-Fi Mode

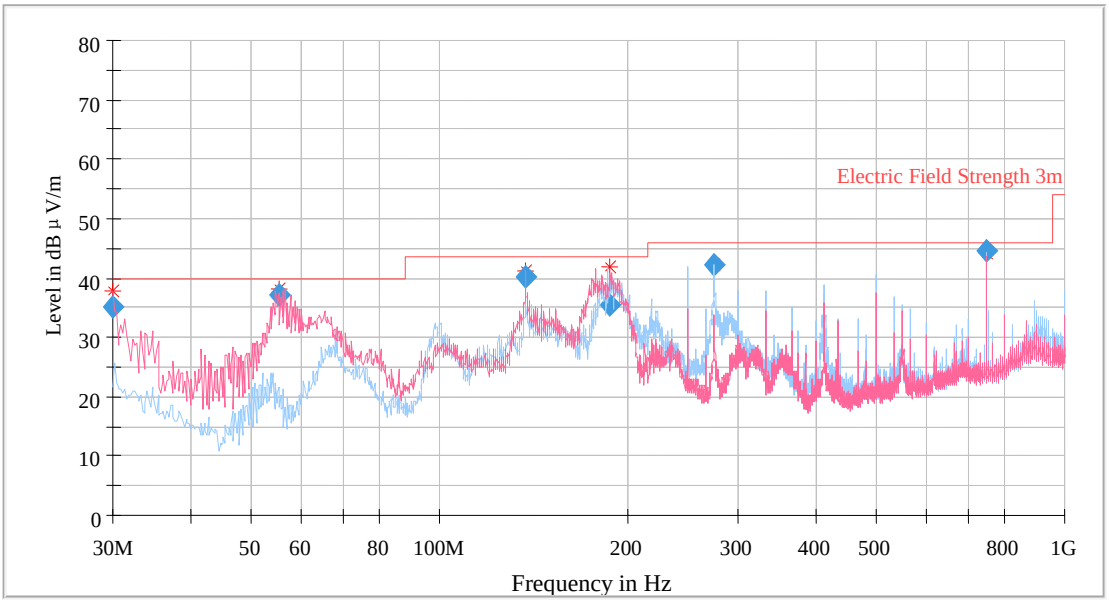
30 MHz to 1 GHz: 802.11g _ Low Channel

Tested Model: VT-M2M-BTA-DE-A



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
41.079300	39.84	40.00	0.16	120.000	128.0	V	147.0	-11.7
41.130100	38.07	40.00	1.93	120.000	134.0	V	61.0	-11.7
49.284600	33.11	40.00	6.89	120.000	138.0	V	173.0	-16.8
57.814400	30.85	40.00	9.15	120.000	131.0	V	162.0	-18.1
66.721500	30.25	40.00	9.75	120.000	129.0	V	197.0	-17.1
68.430300	32.87	40.00	7.13	120.000	130.0	V	13.0	-17.0

Multiple Model: VT-M2M-BTA-DE-ALP



Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.026885	34.96	40.00	5.04	120.000	128.0	V	201.0	-4.4
55.379700	37.10	40.00	2.90	120.000	102.0	V	218.0	-18.1
137.309600	40.23	43.50	3.27	120.000	114.0	V	279.0	-11.7
186.953000	35.28	43.50	8.22	120.000	156.0	H	234.0	-13.8
274.792300	42.04	46.00	3.96	120.000	102.0	H	238.0	-11.3
750.032600	44.46	46.00	1.54	120.000	154.0	H	128.0	-3.1

Above 1GHz

802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2412 MHz									
2412.00	75.24	PK	V	29.12	3.55	0.00	107.91	N/A	N/A
2412.00	70.96	AV	V	29.12	3.55	0.00	103.63	N/A	N/A
2390.00	29.31	PK	V	29.15	3.54	0.00	62.00	74.00	12.00
2390.00	17.07	AV	V	29.15	3.54	0.00	49.76	54.00	4.24
1432.00	44.38	PK	V	25.14	2.76	27.50	44.78	74.00	29.22
1432.00	36.82	AV	V	25.14	2.76	27.50	37.22	54.00	16.78
3000.40	39.31	PK	V	30.20	3.98	27.65	45.84	74.00	28.16
3000.40	31.52	AV	V	30.20	3.98	27.65	38.05	54.00	15.95
5000.80	31.36	PK	V	33.50	5.16	27.23	42.79	74.00	31.21
5000.80	27.96	AV	V	33.50	5.16	27.23	39.39	54.00	14.61
6000.40	30.39	PK	V	34.10	5.76	27.11	43.14	74.00	30.86
6000.40	26.69	AV	V	34.10	5.76	27.11	39.44	54.00	14.56
4824.00	31.76	PK	V	33.04	5.06	27.27	42.59	74.00	31.41
4824.00	21.78	AV	V	33.04	5.06	27.27	32.61	54.00	21.39
7236.00	27.76	PK	V	35.82	6.44	27.10	42.92	74.00	31.08
7236.00	22.34	AV	V	35.82	6.44	27.10	37.50	54.00	16.50
Frequency: 2437 MHz									
2437.00	76.95	PK	V	29.09	3.57	0.00	109.61	N/A	N/A
2437.00	71.20	AV	V	29.09	3.57	0.00	103.86	N/A	N/A
1432.00	44.15	PK	V	25.14	2.76	27.50	44.55	74.00	29.45
1432.00	36.37	AV	V	25.14	2.76	27.50	36.77	54.00	17.23
3000.40	39.52	PK	V	30.20	3.98	27.65	46.05	74.00	27.95
3000.40	31.47	AV	V	30.20	3.98	27.65	38.00	54.00	16.00
5000.80	31.16	PK	V	33.50	5.16	27.23	42.59	74.00	31.41
5000.80	28.18	AV	V	33.50	5.16	27.23	39.61	54.00	14.39
6000.40	30.17	PK	V	34.10	5.76	27.11	42.92	74.00	31.08
6000.40	26.59	AV	V	34.10	5.76	27.11	39.34	54.00	14.66
4874.00	31.32	PK	V	33.17	5.09	27.26	42.32	74.00	31.68
4874.00	21.90	AV	V	33.17	5.09	27.26	32.90	54.00	21.10
7311.00	28.11	PK	V	35.98	6.48	27.11	43.46	74.00	30.54
7311.00	22.53	AV	V	35.98	6.48	27.11	37.88	54.00	16.12
Frequency: 2462 MHz									
2462.00	74.37	PK	V	29.05	3.59	0.00	107.01	N/A	N/A
2462.00	69.91	AV	V	29.05	3.59	0.00	102.55	N/A	N/A
2483.50	30.38	PK	V	29.02	3.61	0.00	63.01	74.00	10.99
2483.50	17.93	AV	V	29.02	3.61	0.00	50.56	54.00	3.44
1432.00	44.28	PK	V	25.14	2.76	27.50	44.68	74.00	29.32
1432.00	36.44	AV	V	25.14	2.76	27.50	36.84	54.00	17.16
3000.40	39.16	PK	V	30.20	3.98	27.65	45.69	74.00	28.31
3000.40	31.44	AV	V	30.20	3.98	27.65	37.97	54.00	16.03
5000.80	31.08	PK	V	33.50	5.16	27.23	42.51	74.00	31.49
5000.80	27.67	AV	V	33.50	5.16	27.23	39.10	54.00	14.90
6000.40	30.80	PK	V	34.10	5.76	27.11	43.55	74.00	30.45
6000.40	26.23	AV	V	34.10	5.76	27.11	38.98	54.00	15.02
4924.00	32.25	PK	V	33.30	5.12	27.25	43.42	74.00	30.58
4924.00	22.03	AV	V	33.30	5.12	27.25	33.20	54.00	20.80
7386.00	27.79	PK	V	36.15	6.52	27.12	43.34	74.00	30.66
7386.00	21.64	AV	V	36.15	6.52	27.12	37.19	54.00	16.81

802.11g Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2412 MHz									
2412	71.66	PK	V	29.12	3.55	0.00	104.33	N/A	N/A
2412	62.34	AV	V	29.12	3.55	0.00	95.01	N/A	N/A
2390	28.98	PK	V	29.15	3.54	0.00	61.67	74.00	12.33
2390	16.52	AV	V	29.15	3.54	0.00	49.21	54.00	4.79
1432.00	44.23	PK	V	25.14	2.76	27.50	44.63	74.00	29.37
1432.00	37.00	AV	V	25.14	2.76	27.50	37.40	54.00	16.60
3000.40	39.65	PK	V	30.20	3.98	27.65	46.18	74.00	27.82
3000.40	31.47	AV	V	30.20	3.98	27.65	38.00	54.00	16.00
5000.80	31.39	PK	V	33.50	5.16	27.23	42.82	74.00	31.18
5000.80	27.81	AV	V	33.50	5.16	27.23	39.24	54.00	14.76
6000.40	30.23	PK	V	34.10	5.76	27.11	42.98	74.00	31.02
6000.40	26.91	AV	V	34.10	5.76	27.11	39.66	54.00	14.34
4824	32.07	PK	V	33.04	5.06	27.27	42.90	74.00	31.10
4824	22.97	AV	V	33.04	5.06	27.27	33.80	54.00	20.20
7236	27.97	PK	V	35.82	6.44	27.10	43.13	74.00	30.87
7236	22.68	AV	V	35.82	6.44	27.10	37.84	54.00	16.16
Frequency: 2437 MHz									
2437	73.42	PK	V	29.09	3.57	0.00	106.08	N/A	N/A
2437	62.61	AV	V	29.09	3.57	0.00	95.27	N/A	N/A
1432.00	43.91	PK	V	25.14	2.76	27.50	44.31	74.00	29.69
1432.00	36.43	AV	V	25.14	2.76	27.50	36.83	54.00	17.17
3000.40	39.49	PK	V	30.20	3.98	27.65	46.02	74.00	27.98
3000.40	31.87	AV	V	30.20	3.98	27.65	38.40	54.00	15.60
5000.80	31.78	PK	V	33.50	5.16	27.23	43.21	74.00	30.79
5000.80	28.37	AV	V	33.50	5.16	27.23	39.80	54.00	14.20
6000.40	29.97	PK	V	34.10	5.76	27.11	42.72	74.00	31.28
6000.40	26.20	AV	V	34.10	5.76	27.11	38.95	54.00	15.05
4874	32.22	PK	V	33.17	5.09	27.26	43.22	74.00	30.78
4874	22.74	AV	V	33.17	5.09	27.26	33.74	54.00	20.26
7311	27.33	PK	V	35.98	6.48	27.11	42.68	74.00	31.32
7311	21.99	AV	V	35.98	6.48	27.11	37.34	54.00	16.66
Frequency: 2462 MHz									
2462	70.85	PK	V	29.05	3.59	0.00	103.49	N/A	N/A
2462	62.02	AV	V	29.05	3.59	0.00	94.66	N/A	N/A
2483.5	30.83	PK	V	29.02	3.61	0.00	63.46	74.00	10.54
2483.5	17.59	AV	V	29.02	3.61	0.00	50.22	54.00	3.78
1432.00	44.24	PK	V	25.14	2.76	27.50	44.64	74.00	29.36
1432.00	36.51	AV	V	25.14	2.76	27.50	36.91	54.00	17.09
3000.40	39.42	PK	V	30.20	3.98	27.65	45.95	74.00	28.05
3000.40	31.29	AV	V	30.20	3.98	27.65	37.82	54.00	16.18
5000.80	31.19	PK	V	33.50	5.16	27.23	42.62	74.00	31.38
5000.80	28.36	AV	V	33.50	5.16	27.23	39.79	54.00	14.21
6000.40	30.89	PK	V	34.10	5.76	27.11	43.64	74.00	30.36
6000.40	26.21	AV	V	34.10	5.76	27.11	38.96	54.00	15.04
4924	31.51	PK	V	33.30	5.12	27.25	42.68	74.00	31.32
4924	22.73	AV	V	33.30	5.12	27.25	33.90	54.00	20.10
7386	27.70	PK	V	36.15	6.52	27.12	43.25	74.00	30.75
7386	21.62	AV	V	36.15	6.52	27.12	37.17	54.00	16.83

802.11n-HT20 Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2412 MHz									
2412	71.51	PK	V	29.12	3.55	0.00	104.18	N/A	N/A
2412	62.51	AV	V	29.12	3.55	0.00	95.18	N/A	N/A
2390	29.59	PK	V	29.15	3.54	0.00	62.28	74.00	11.72
2390	16.93	AV	V	29.15	3.54	0.00	49.62	54.00	4.38
1432.00	44.27	PK	V	25.14	2.76	27.50	44.67	74.00	29.33
1432.00	36.61	AV	V	25.14	2.76	27.50	37.01	54.00	16.99
3000.40	39.19	PK	V	30.20	3.98	27.65	45.72	74.00	28.28
3000.40	31.43	AV	V	30.20	3.98	27.65	37.96	54.00	16.04
5000.80	31.57	PK	V	33.50	5.16	27.23	43.00	74.00	31.00
5000.80	28.16	AV	V	33.50	5.16	27.23	39.59	54.00	14.41
6000.40	30.83	PK	V	34.10	5.76	27.11	43.58	74.00	30.42
6000.40	26.26	AV	V	34.10	5.76	27.11	39.01	54.00	14.99
4824	31.42	PK	V	33.04	5.06	27.27	42.25	74.00	31.75
4824	22.40	AV	V	33.04	5.06	27.27	33.23	54.00	20.77
7236	27.43	PK	V	35.82	6.44	27.10	42.59	74.00	31.41
7236	22.35	AV	V	35.82	6.44	27.10	37.51	54.00	16.49
Frequency: 2437 MHz									
2437	72.10	PK	V	29.09	3.57	0.00	104.76	N/A	N/A
2437	62.68	AV	V	29.09	3.57	0.00	95.34	N/A	N/A
2031.9	39.29	PK	V	29.66	3.27	27.67	44.55	74.00	29.45
2031.9	31.51	AV	V	29.66	3.27	27.67	36.77	54.00	17.23
1432.00	44.16	PK	V	25.14	2.76	27.50	44.56	74.00	29.44
1432.00	36.81	AV	V	25.14	2.76	27.50	37.21	54.00	16.79
3000.40	39.80	PK	V	30.20	3.98	27.65	46.33	74.00	27.67
3000.40	31.02	AV	V	30.20	3.98	27.65	37.55	54.00	16.45
5000.80	31.02	PK	V	33.50	5.16	27.23	42.45	74.00	31.55
5000.80	28.40	AV	V	33.50	5.16	27.23	39.83	54.00	14.17
6000.40	29.89	PK	V	34.10	5.76	27.11	42.64	74.00	31.36
6000.40	26.80	AV	V	34.10	5.76	27.11	39.55	54.00	14.45
4874	31.97	PK	V	33.17	5.09	27.26	42.97	74.00	31.03
4874	22.12	AV	V	33.17	5.09	27.26	33.12	54.00	20.88
7311	28.23	PK	V	35.98	6.48	27.11	47.09	74.00	26.91
7311	22.68	AV	V	35.98	6.48	27.11	36.39	54.00	17.61
Frequency: 2462 MHz									
2462	70.96	PK	V	29.05	3.59	0.00	103.60	N/A	N/A
2462	61.85	AV	V	29.05	3.59	0.00	94.49	N/A	N/A
2483.5	30.07	PK	V	29.02	3.61	0.00	62.70	74.00	11.30
2483.5	17.67	AV	V	29.02	3.61	0.00	50.30	54.00	3.70
1432.00	44.21	PK	V	25.14	2.76	27.50	44.61	74.00	29.39
1432.00	36.91	AV	V	25.14	2.76	27.50	37.31	54.00	16.69
3000.40	39.56	PK	V	30.20	3.98	27.65	46.09	74.00	27.91
3000.40	31.66	AV	V	30.20	3.98	27.65	38.19	54.00	15.81
5000.80	31.02	PK	V	33.50	5.16	27.23	42.45	74.00	31.55
5000.80	27.89	AV	V	33.50	5.16	27.23	39.32	54.00	14.68
6000.40	30.53	PK	V	34.10	5.76	27.11	43.28	74.00	30.72
6000.40	26.28	AV	V	34.10	5.76	27.11	39.03	54.00	14.97
4924	32.05	PK	V	33.30	5.12	27.25	43.22	74.00	30.78
4924	22.85	AV	V	33.30	5.12	27.25	34.02	54.00	19.98
7386	27.81	PK	V	36.15	6.52	27.12	43.36	74.00	30.64
7386	22.35	AV	V	36.15	6.52	27.12	37.90	54.00	16.10

802.11n-HT40 Mode

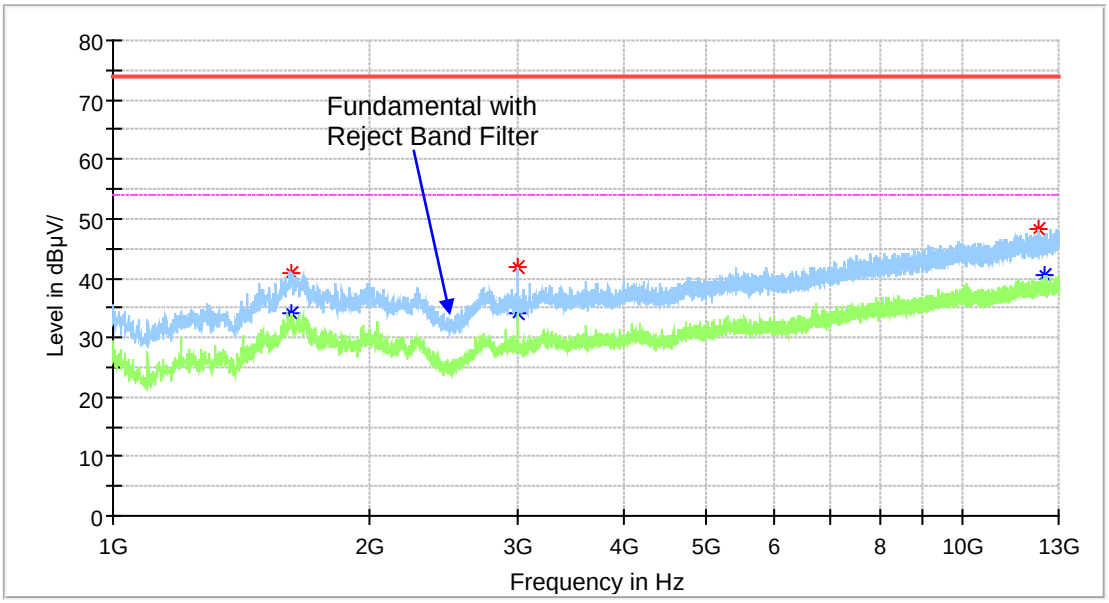
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2422 MHz									
2422	69.09	PK	V	29.11	3.56	0.00	101.76	N/A	N/A
2422	59.53	AV	V	29.11	3.56	0.00	92.20	N/A	N/A
2390	32.38	PK	V	29.15	3.54	0.00	65.07	74.00	8.93
2390	17.42	AV	V	29.15	3.54	0.00	50.11	54.00	3.89
1432.00	44.84	PK	V	25.14	2.76	27.50	45.24	74.00	28.76
1432.00	37.13	AV	V	25.14	2.76	27.50	37.53	54.00	16.47
3000.40	39.59	PK	V	30.20	3.98	27.65	46.12	74.00	27.88
3000.40	31.58	AV	V	30.20	3.98	27.65	38.11	54.00	15.89
5000.80	31.60	PK	V	33.50	5.16	27.23	43.03	74.00	30.97
5000.80	27.66	AV	V	33.50	5.16	27.23	39.09	54.00	14.91
6000.40	30.53	PK	V	34.10	5.76	27.11	43.28	74.00	30.72
6000.40	26.68	AV	V	34.10	5.76	27.11	39.43	54.00	14.57
7266	27.35	PK	V	35.89	6.46	27.11	42.59	74.00	31.41
7266	24.37	AV	V	35.89	6.46	27.11	39.61	54.00	14.39
4844	32.18	PK	V	33.09	5.07	27.26	43.08	74.00	30.92
4844	28.57	AV	V	33.09	5.07	27.26	39.47	54.00	14.53
7266	27.49	PK	V	35.89	6.46	27.11	46.11	74.00	27.89
7266	24.43	AV	V	35.89	6.46	27.11	36.05	54.00	17.96
Frequency: 2437 MHz									
2437	68.89	PK	V	29.09	3.57	0.00	101.55	N/A	N/A
2437	59.57	AV	V	29.09	3.57	0.00	92.23	N/A	N/A
1432.00	43.89	PK	V	25.14	2.76	27.50	44.29	74.00	29.71
1432.00	36.34	AV	V	25.14	2.76	27.50	36.74	54.00	17.26
3000.40	39.09	PK	V	30.20	3.98	27.65	45.62	74.00	28.38
3000.40	31.79	AV	V	30.20	3.98	27.65	38.32	54.00	15.68
5000.80	31.62	PK	V	33.50	5.16	27.23	43.05	74.00	30.95
5000.80	28.21	AV	V	33.50	5.16	27.23	39.64	54.00	14.36
6000.40	30.33	PK	V	34.10	5.76	27.11	43.08	74.00	30.92
6000.40	26.44	AV	V	34.10	5.76	27.11	39.19	54.00	14.81
4874	31.92	PK	V	33.17	5.09	27.26	42.92	74.00	31.08
4874	22.08	AV	V	33.17	5.09	27.26	33.08	54.00	20.92
7311	27.97	PK	V	35.98	6.48	27.11	43.32	74.00	30.68
7311	22.13	AV	V	35.98	6.48	27.11	37.48	54.00	16.52

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2452 MHz									
2452	67.84	PK	V	29.07	3.58	0.00	100.49	N/A	N/A
2452	58.22	AV	V	29.07	3.58	0.00	90.87	N/A	N/A
2483.5	32.07	PK	V	29.02	3.61	0.00	64.70	74.00	9.30
2483.5	18.6	AV	V	29.02	3.61	0.00	51.23	54.00	2.77
1432.00	44.72	PK	V	25.14	2.76	27.50	45.12	74.00	28.88
1432.00	37.19	AV	V	25.14	2.76	27.50	37.59	54.00	16.41
3000.40	39.12	PK	V	30.20	3.98	27.65	45.65	74.00	28.35
3000.40	32.00	AV	V	30.20	3.98	27.65	38.53	54.00	15.47
5000.80	31.37	PK	V	33.50	5.16	27.23	42.80	74.00	31.20
5000.80	27.61	AV	V	33.50	5.16	27.23	39.04	54.00	14.96
6000.40	29.95	PK	V	34.10	5.76	27.11	42.70	74.00	31.30
6000.40	27.19	AV	V	34.10	5.76	27.11	39.94	54.00	14.06
4904	32.07	PK	V	33.25	5.10	27.25	43.17	74.00	30.83
4904	21.92	AV	V	33.25	5.10	27.25	33.02	54.00	20.98
7356	28.22	PK	V	36.08	6.51	27.12	43.69	74.00	30.31
7356	22.63	AV	V	36.08	6.51	27.12	38.10	54.00	15.90

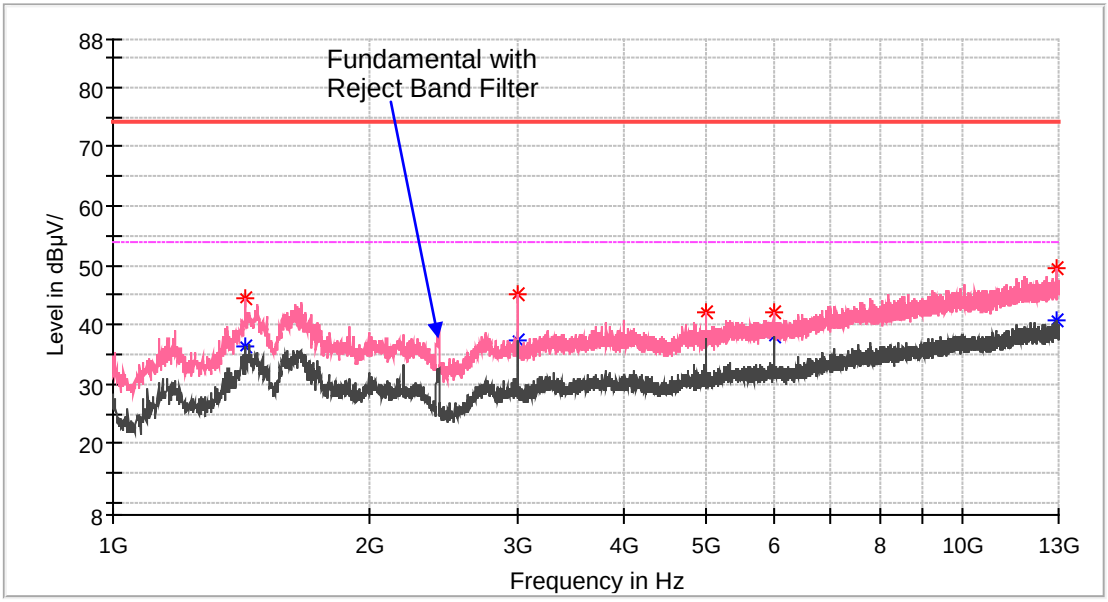
Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude

Please refer to the below pre-scan plot of worst case:

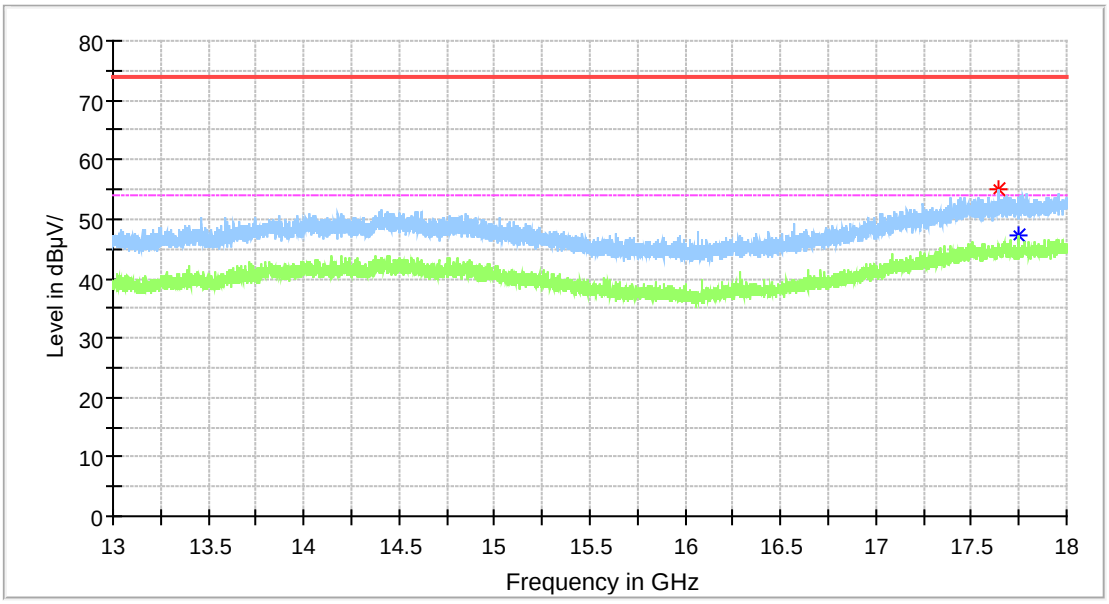
802.11n-HT40 Mode: High Channel_Horizontal_1GHz-13GHz



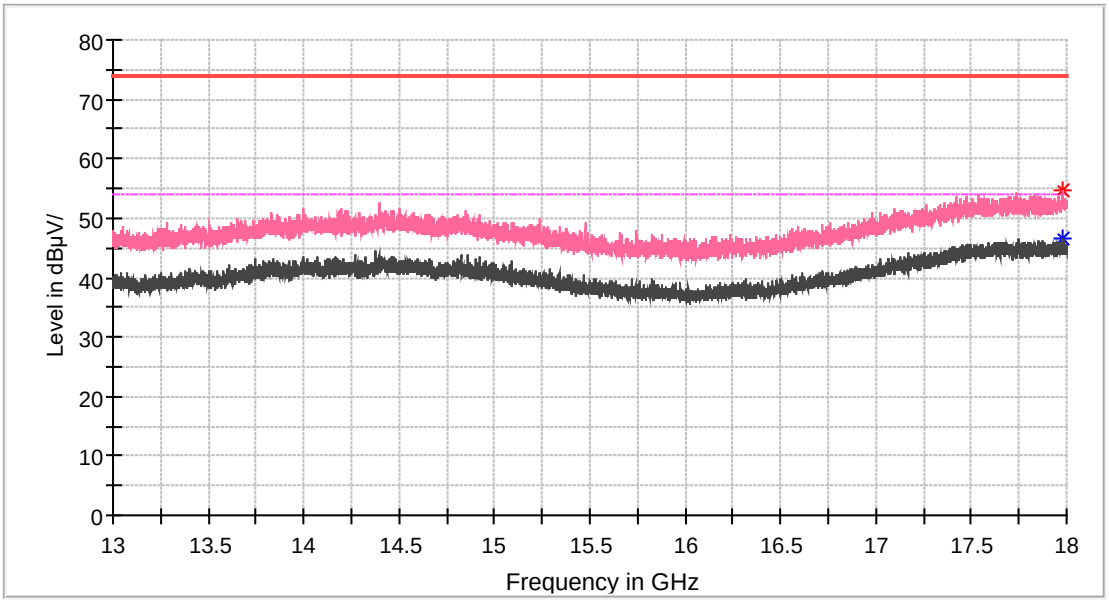
802.11n-HT40 Mode: High Channel_Vertical_1GHz-13GHz



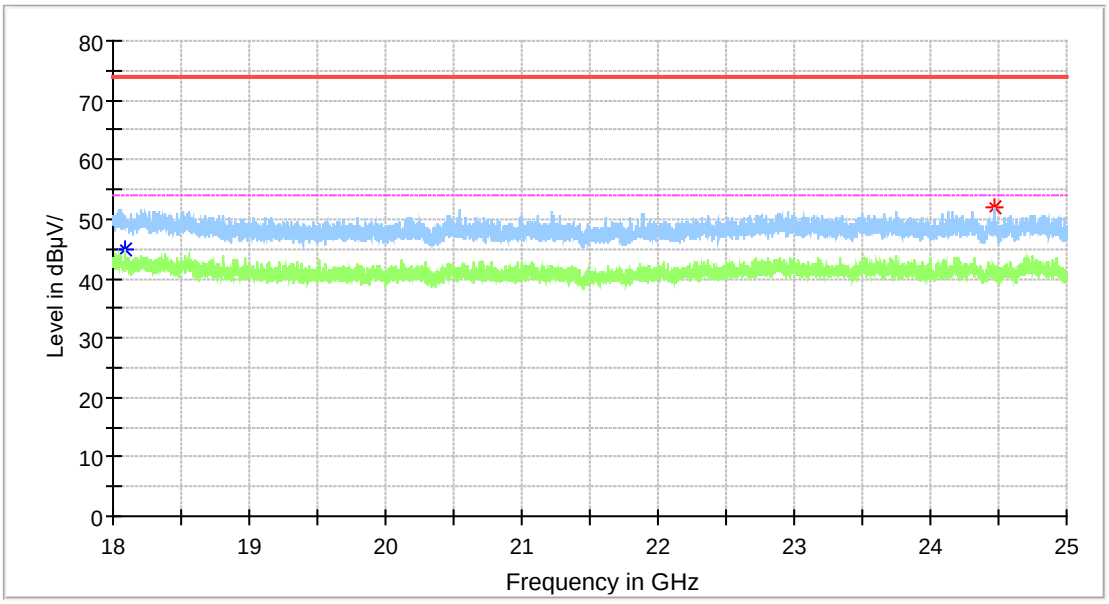
802.11n-HT40 Mode: High Channel_Horizontal_13 GHz-18 GHz



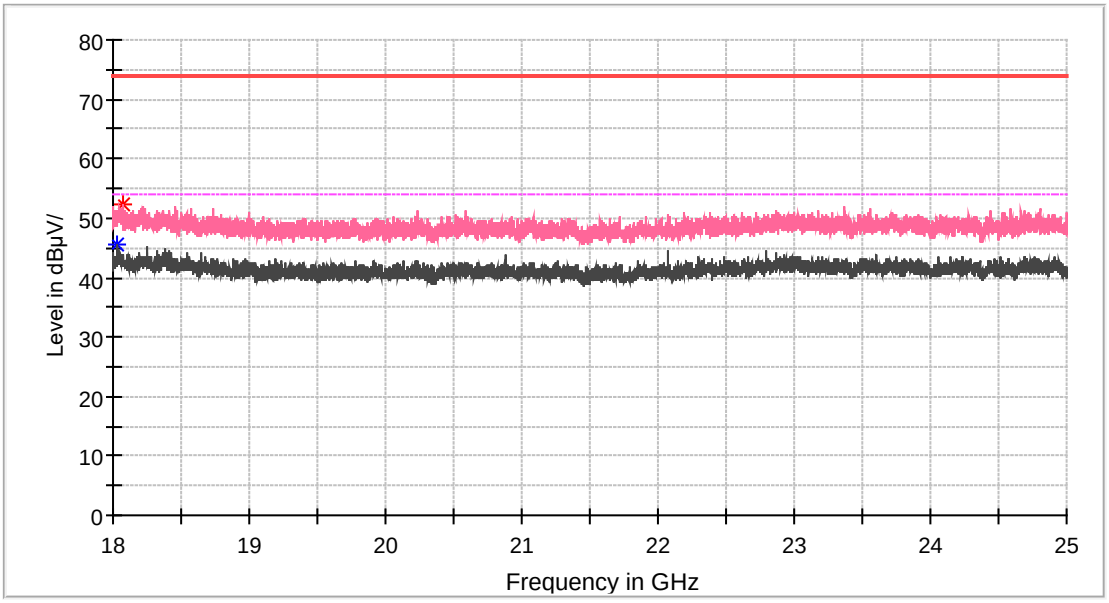
802.11n-HT40 Mode: High Channel_Vertical_13 GHz-18 GHz



802.11n-HT40 Mode: High Channel_Horizontal_18 GHz-25 GHz



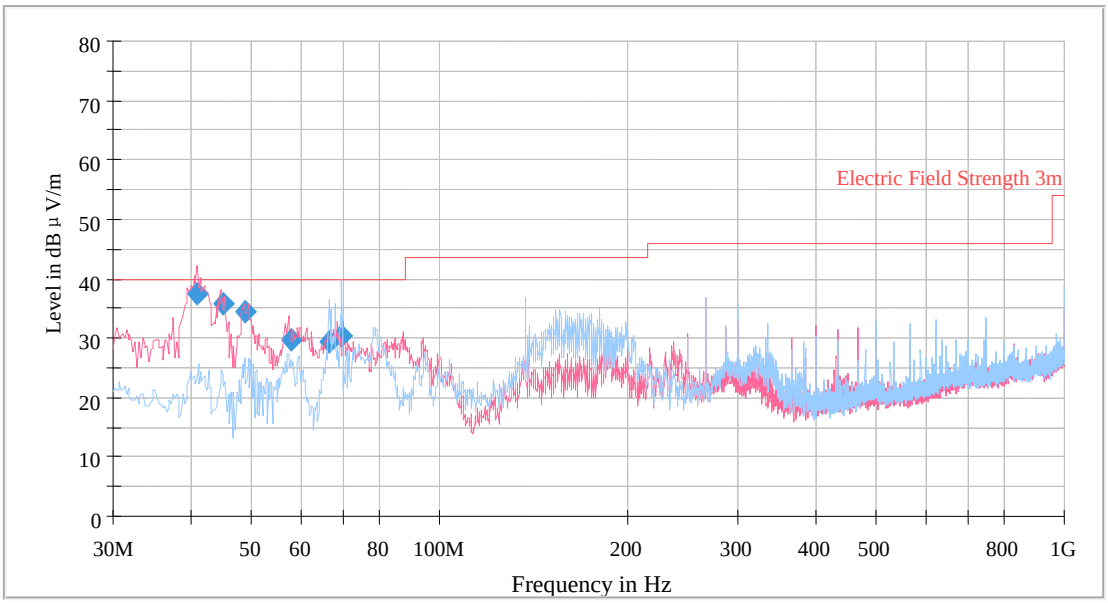
802.11n-HT40 Mode: High Channel_Vertical_18 GHz-25 GHz



LE 1M Mode

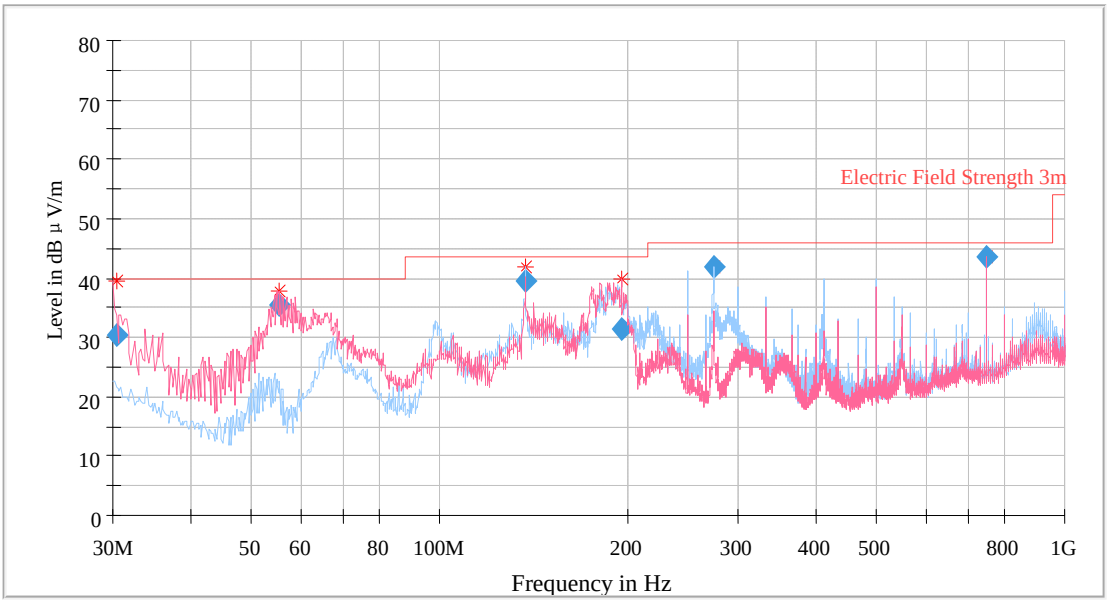
30 MHz to 1 GHz-Middle channel-worst case

Tested Model: VT-M2M-BTA-DE-A



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.915600	37.40	40.00	2.60	120.000	151.0	V	212.0	-11.6
44.989500	35.70	40.00	4.30	120.000	127.0	V	126.0	-14.4
48.971600	34.58	40.00	5.42	120.000	129.0	V	116.0	-16.6
57.829200	29.87	40.00	10.13	120.000	174.0	V	133.0	-18.1
66.699300	29.37	40.00	10.63	120.000	174.0	H	235.0	-17.1
69.742400	30.54	40.00	9.46	120.000	169.0	H	54.0	-16.9

Multiple Model: VT-M2M-BTA-DE-ALP



Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.433800	30.23	40.00	9.77	120.000	102.0	V	255.0	-4.7
55.471900	35.43	40.00	4.57	120.000	158.0	V	327.0	-18.1
137.300000	39.34	43.50	4.16	120.000	154.0	H	236.0	-11.7
196.261500	31.33	43.50	12.17	120.000	119.0	V	33.0	-13.1
274.505900	41.95	46.00	4.05	120.000	160.0	H	237.0	-11.3
750.043400	43.68	46.00	2.32	120.000	163.0	V	156.0	-3.1

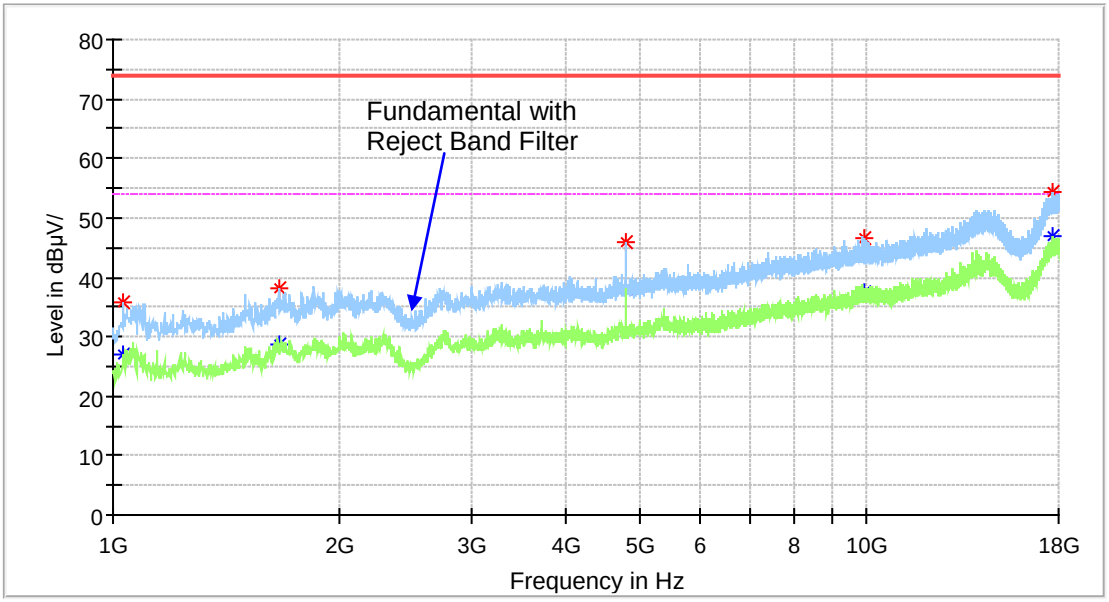
Above 1 GHz

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2402 MHz									
2402	72.91	PK	V	29.14	3.55	0.00	105.60	N/A	N/A
2402	72.09	AV	V	29.14	3.55	0.00	104.78	N/A	N/A
2390	33.61	PK	V	29.15	3.54	0.00	66.30	74.00	7.70
2390	20.32	AV	V	29.15	3.54	0.00	53.01	54.00	0.99
1775.2	35.63	PK	V	27.77	3.06	27.61	38.85	74.00	35.15
1775.2	24.36	AV	V	27.77	3.06	27.61	27.58	54.00	26.42
2999.2	33.36	PK	V	30.20	3.98	27.65	39.89	74.00	34.11
2999.2	26.36	AV	V	30.20	3.98	27.65	32.89	54.00	21.11
5000.1	31.36	PK	V	33.50	5.16	27.23	42.79	74.00	31.21
5000.1	20.14	AV	V	33.50	5.16	27.23	31.57	54.00	22.43
4804	41.36	PK	V	32.99	5.05	27.27	52.13	74.00	21.87
4804	36.71	AV	V	32.99	5.05	27.27	47.48	54.00	6.52
7206	28.36	PK	V	35.75	6.43	27.10	43.44	74.00	30.56
7206	22.47	AV	V	35.75	6.43	27.10	37.55	54.00	16.45
Frequency: 2440 MHz									
2440	73.98	PK	V	29.08	3.58	0.00	106.64	N/A	N/A
2440	73.21	AV	V	29.08	3.58	0.00	105.87	N/A	N/A
1775.2	35.65	PK	V	27.77	3.06	27.61	38.87	74.00	35.13
1775.2	24.61	AV	V	27.77	3.06	27.61	27.83	54.00	26.17
2999.2	33.24	PK	V	30.20	3.98	27.65	39.77	74.00	34.23
2999.2	26.13	AV	V	30.20	3.98	27.65	32.66	54.00	21.34
5000.1	31.40	PK	V	33.50	5.16	27.23	42.83	74.00	31.17
5000.1	19.93	AV	V	33.50	5.16	27.23	31.36	54.00	22.64
4880	41.25	PK	V	33.19	5.09	27.26	52.27	74.00	21.73
4880	36.50	AV	V	33.19	5.09	27.26	47.52	54.00	6.48
7320	28.52	PK	V	36.00	6.49	27.11	43.90	74.00	30.10
7320	22.58	AV	V	36.00	6.49	27.11	37.96	54.00	16.04
Frequency: 2480 MHz									
2480	73.52	PK	V	29.03	3.61	0.00	106.16	N/A	N/A
2480	72.76	AV	V	29.03	3.61	0.00	105.40	N/A	N/A
2483.5	30.24	PK	V	29.02	3.61	0.00	62.87	74.00	11.13
2483.5	18.36	AV	V	29.02	3.61	0.00	50.99	54.00	3.01
1775.2	35.57	PK	V	27.77	3.06	27.61	38.79	74.00	35.21
1775.2	24.63	AV	V	27.77	3.06	27.61	27.85	54.00	26.15
2999.2	33.60	PK	V	30.20	3.98	27.65	40.13	74.00	33.87
2999.2	26.12	AV	V	30.20	3.98	27.65	32.65	54.00	21.35
5000.1	31.54	PK	V	33.50	5.16	27.23	42.97	74.00	31.03
5000.1	19.99	AV	V	33.50	5.16	27.23	31.42	54.00	22.58
4960	41.22	PK	V	33.40	5.14	27.24	52.52	74.00	21.48
4960	36.81	AV	V	33.40	5.14	27.24	48.11	54.00	5.89
7440	28.46	PK	V	36.27	6.55	27.13	44.15	74.00	29.85
7440	22.64	AV	V	36.27	6.55	27.13	38.33	54.00	15.67

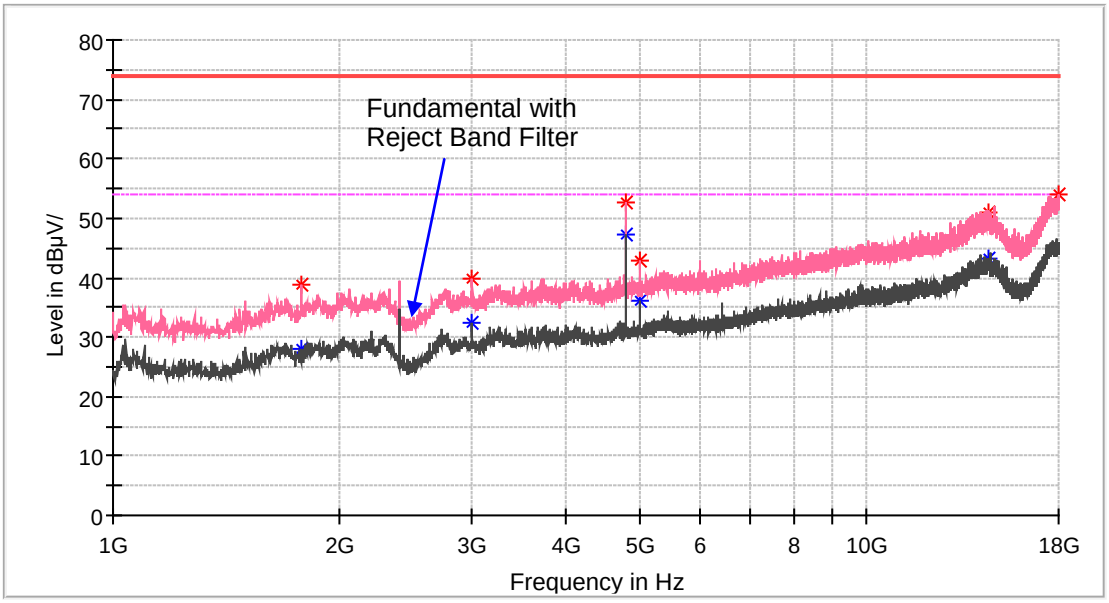
Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude

Please refer to the below pre-scan plot of worst case:

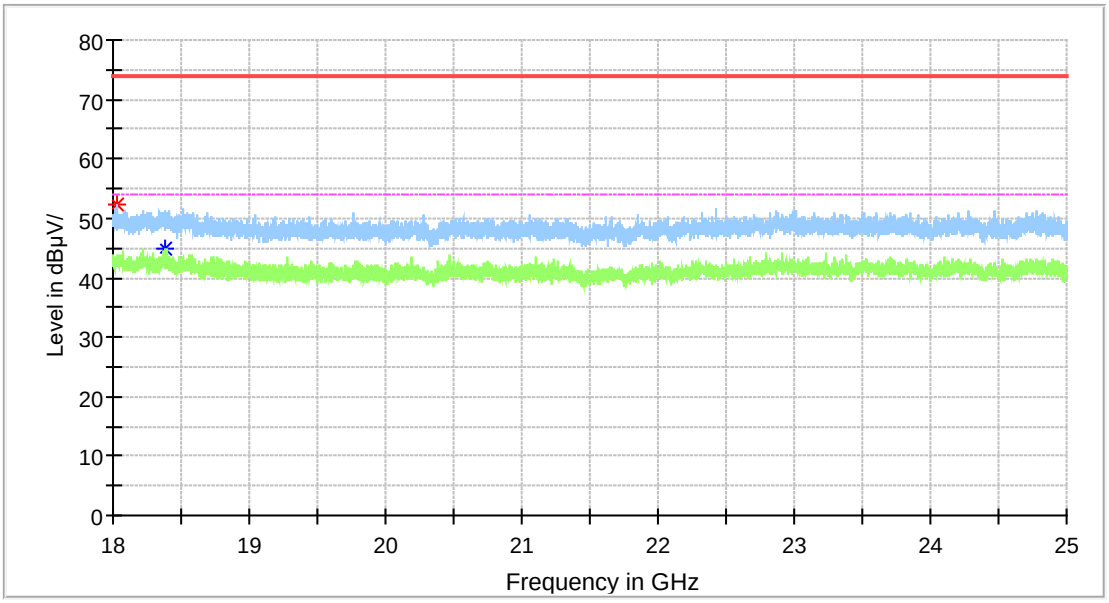
Low Channel_Horizontal_1GHz-18GHz



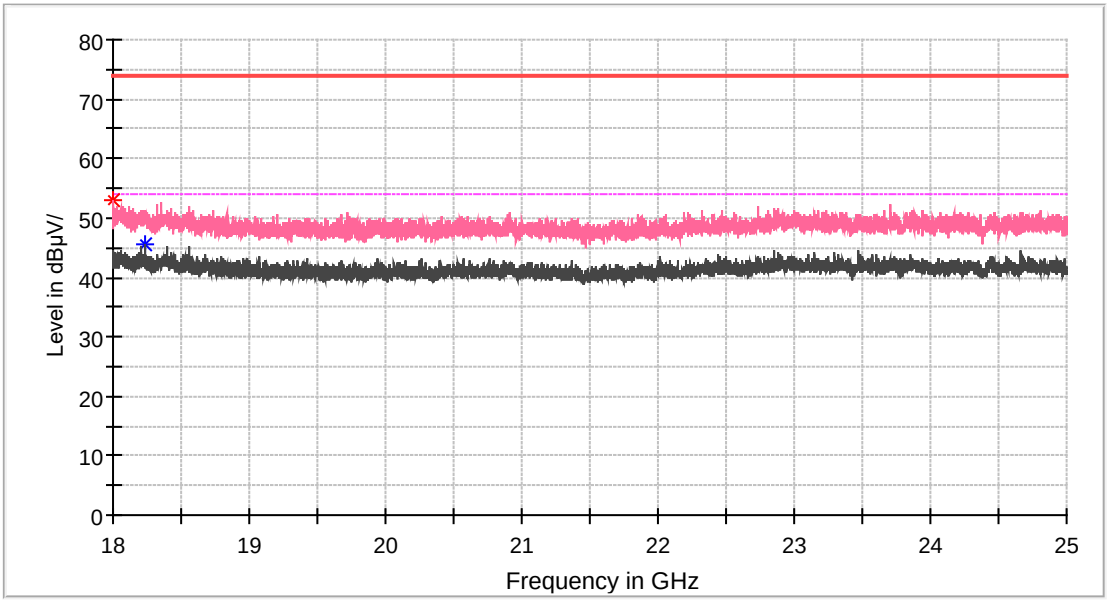
Low Channel _Vertical_1GHz-18GHz



Low Channel _Horizontal_18GHz-25GHz



Low Channel _Vertical_18GHz-25GHz



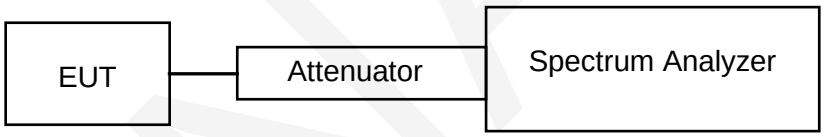
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	19 °C
Relative Humidity:	60 %
ATM Pressure:	96.1 kPa

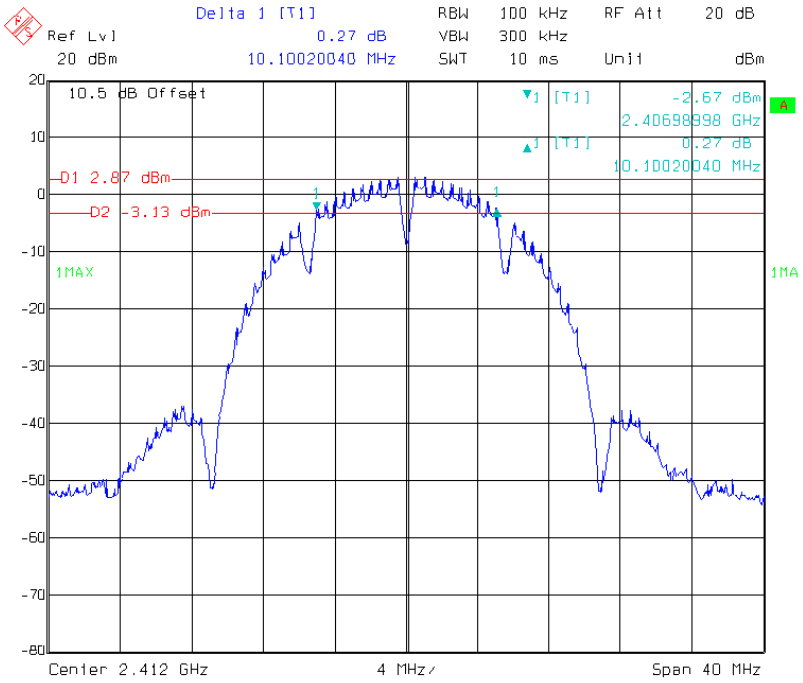
The testing was performed by Tian Maofan on 2020-03-11.

Test Mode: Transmitting

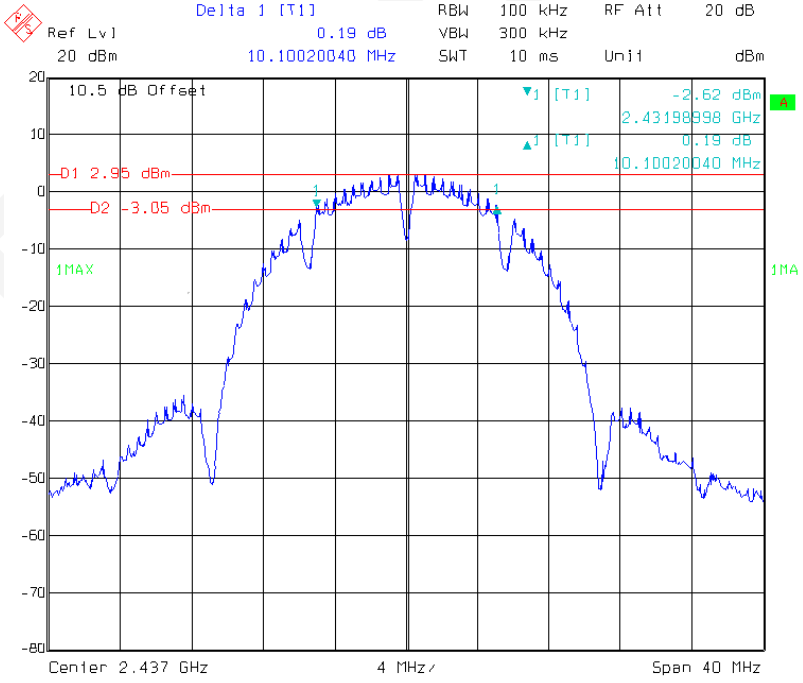
Test Result: Compliance. Please refer to the following table and plots.

Mode	Channel	Frequency(MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11 b	Low	2412	10.100	≥0.50
	Middle	2437	10.100	≥0.50
	High	2462	10.100	≥0.50
802.11 g	Low	2412	17.796	≥0.50
	Middle	2437	17.796	≥0.50
	High	2462	17.796	≥0.50
802.11 n20	Low	2412	17.796	≥0.50
	Middle	2437	17.796	≥0.50
	High	2462	17.796	≥0.50
802.11 n40	Low	2422	37.675	≥0.50
	Middle	2437	37.675	≥0.50
	High	2452	37.675	≥0.50
LE 1M	Low	2402	0.741	≥0.50
	Middle	2440	0.745	≥0.50
	High	2480	0.745	≥0.50

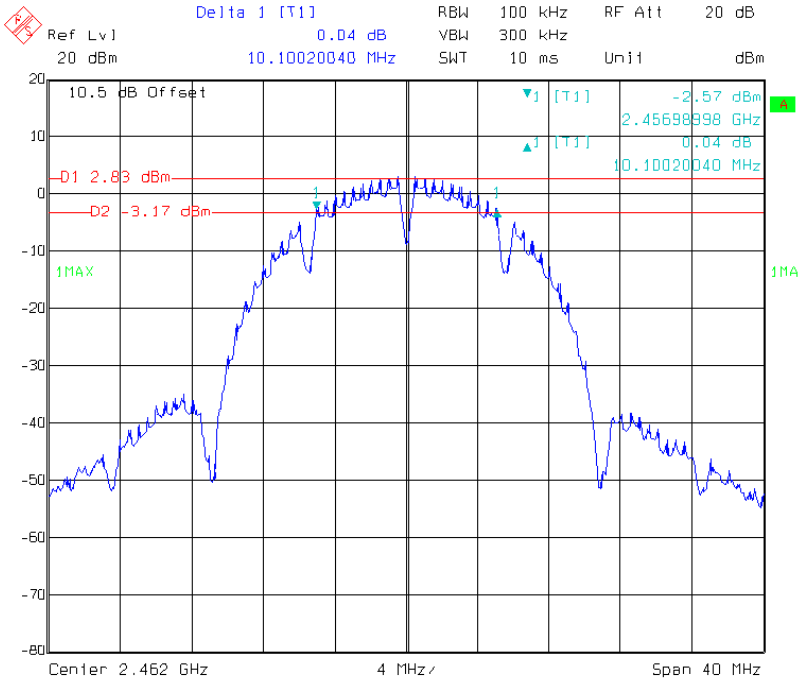
Wi-Fi mode, 802.11b Low Channel



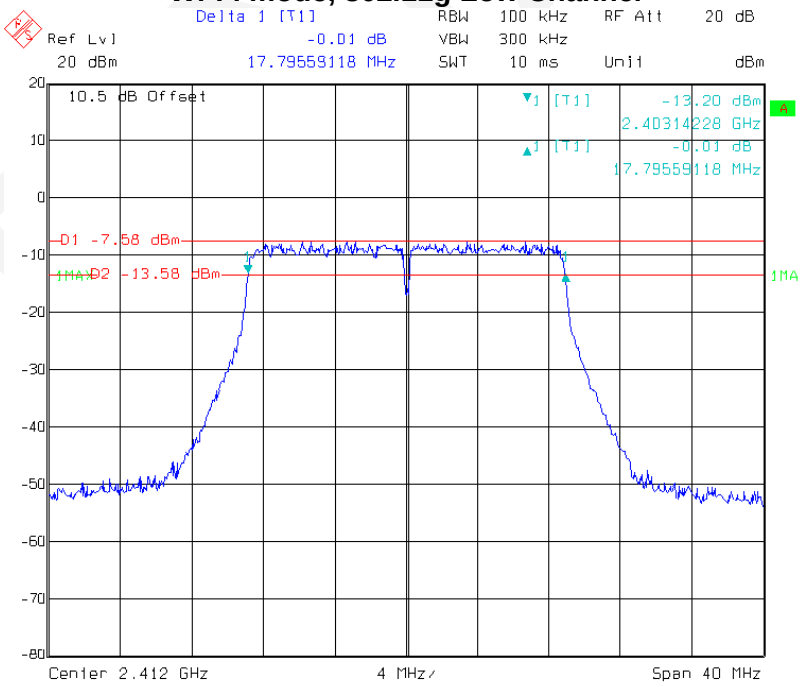
Wi-Fi mode, 802.11b Middle Channel



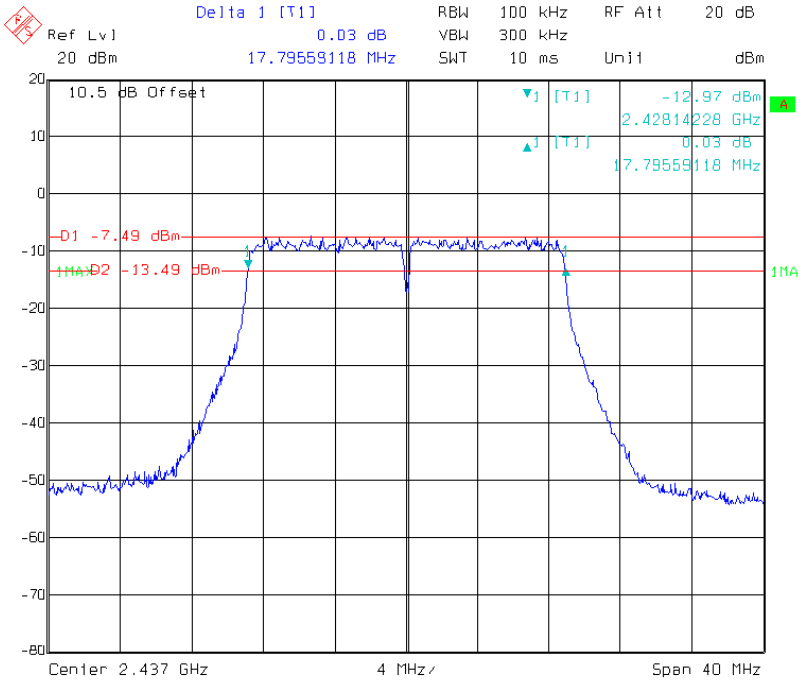
Wi-Fi mode, 802.11b High Channel



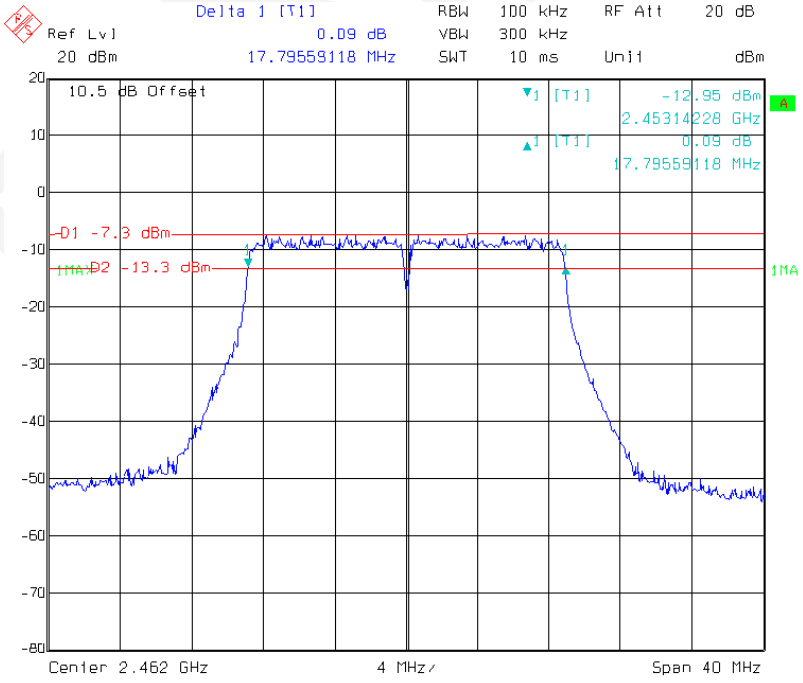
Wi-Fi mode, 802.11g Low Channel



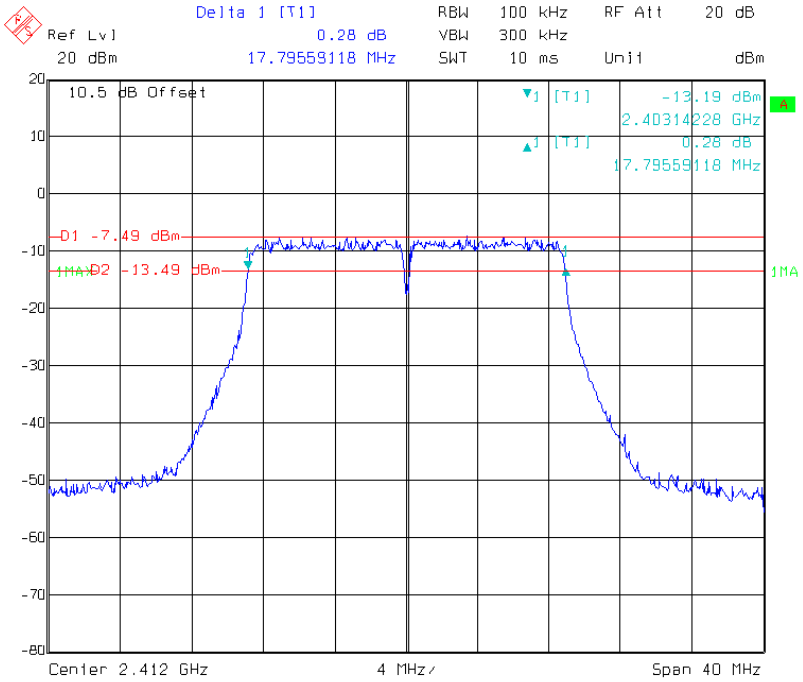
Wi-Fi mode, 802.11g Middle Channel



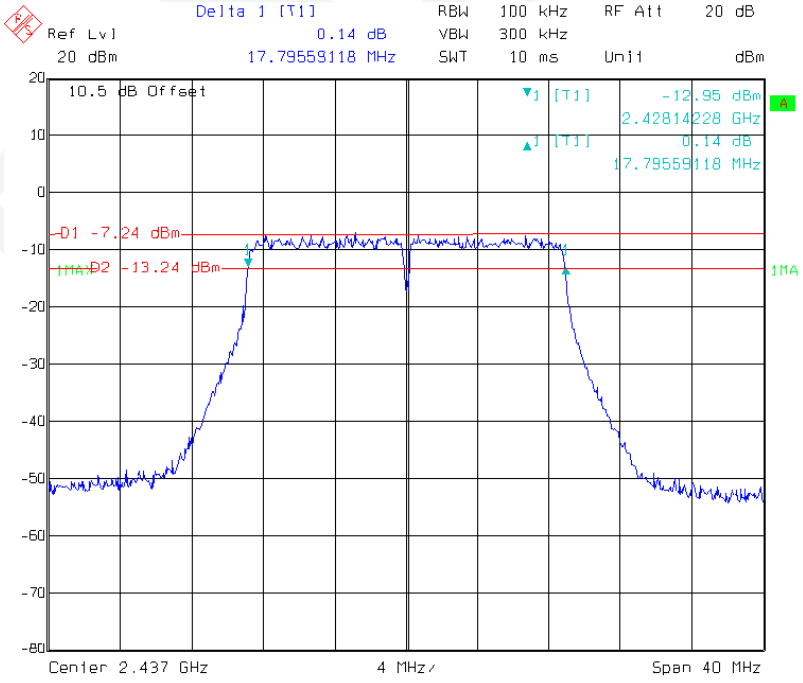
Wi-Fi mode, 802.11g High Channel



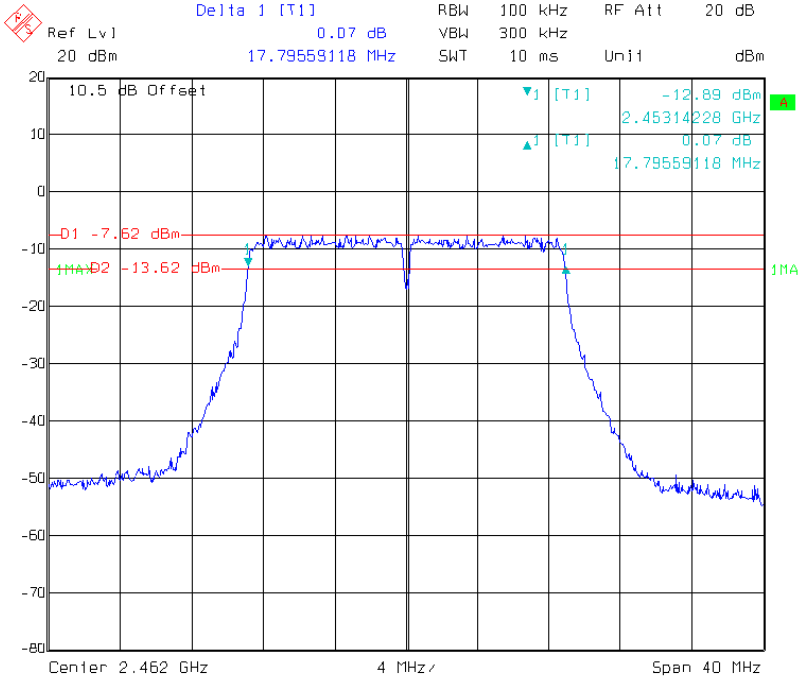
Wi-Fi mode, 802.11n-HT20 Low Channel



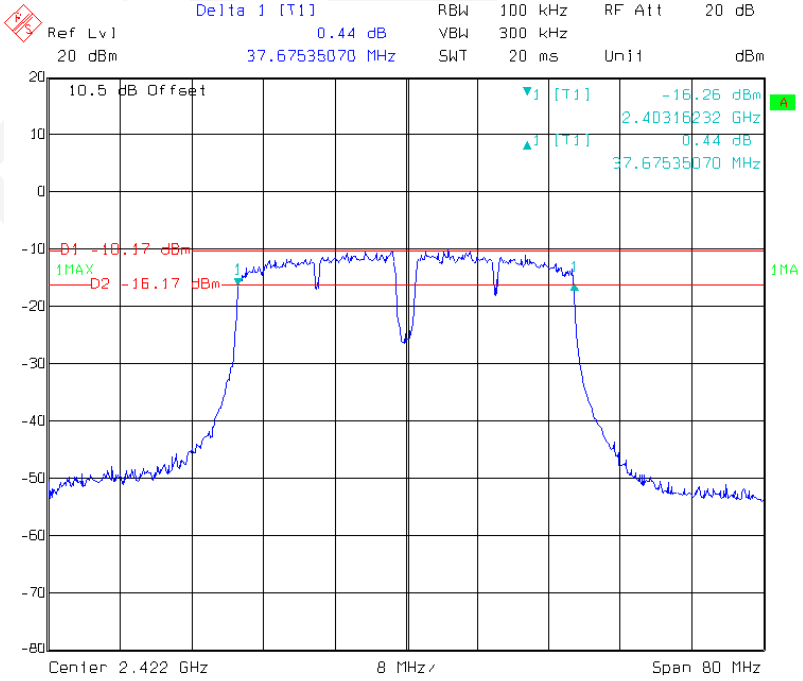
Wi-Fi mode, 802.11n-HT20 Middle Channel



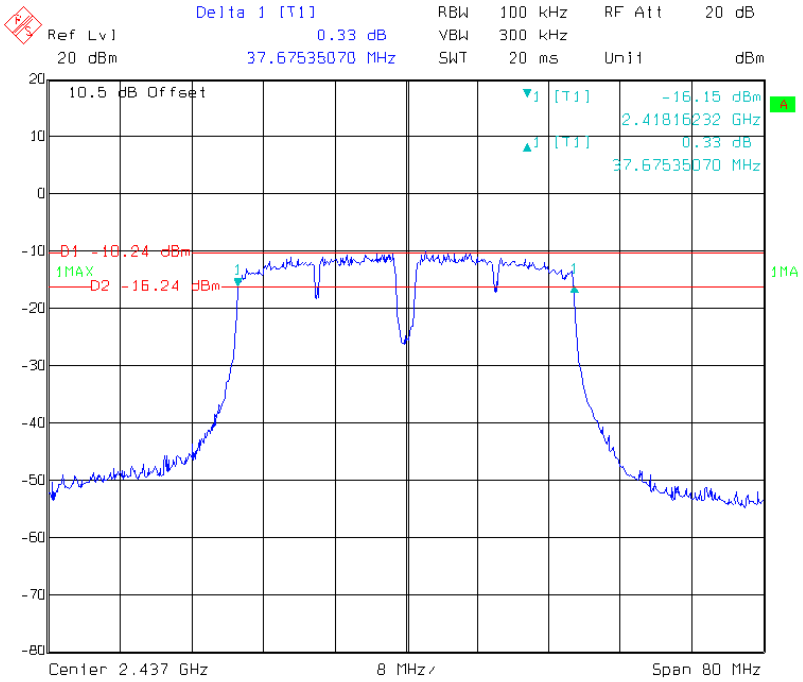
Wi-Fi mode, 802.11n-HT20 High Channel



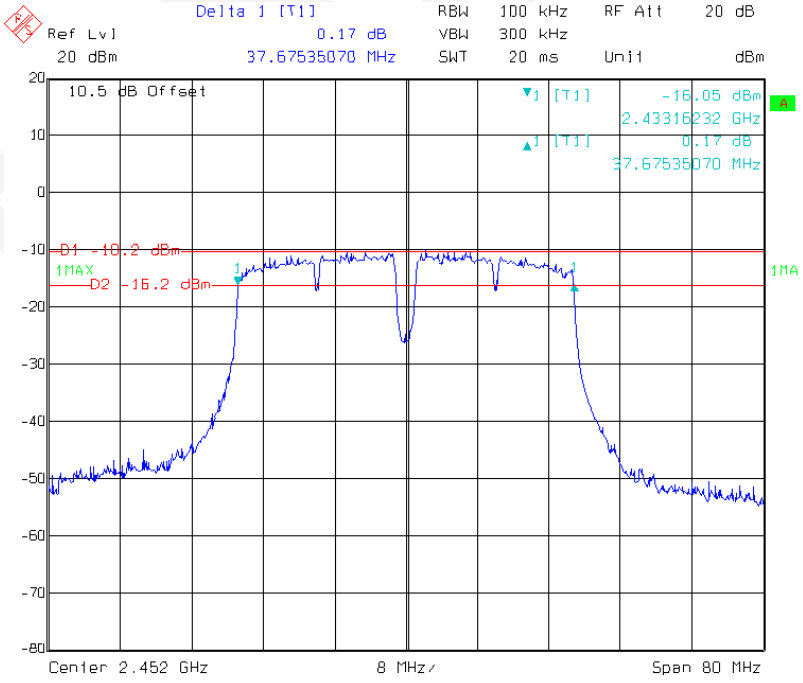
Wi-Fi mode, 802.11n-HT40 Low Channel



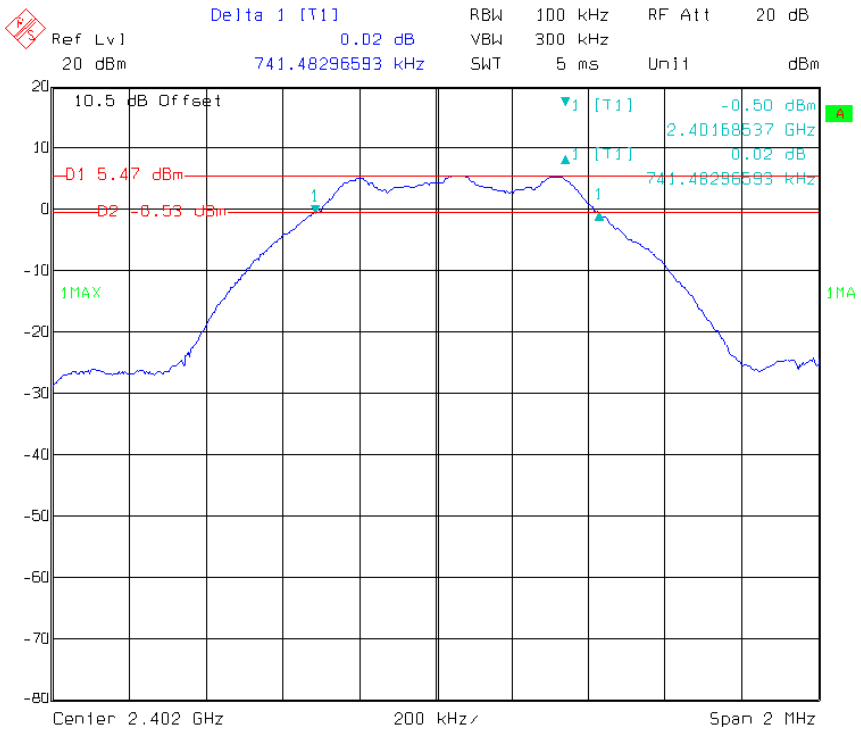
Wi-Fi mode, 802.11n-HT40 Middle Channel



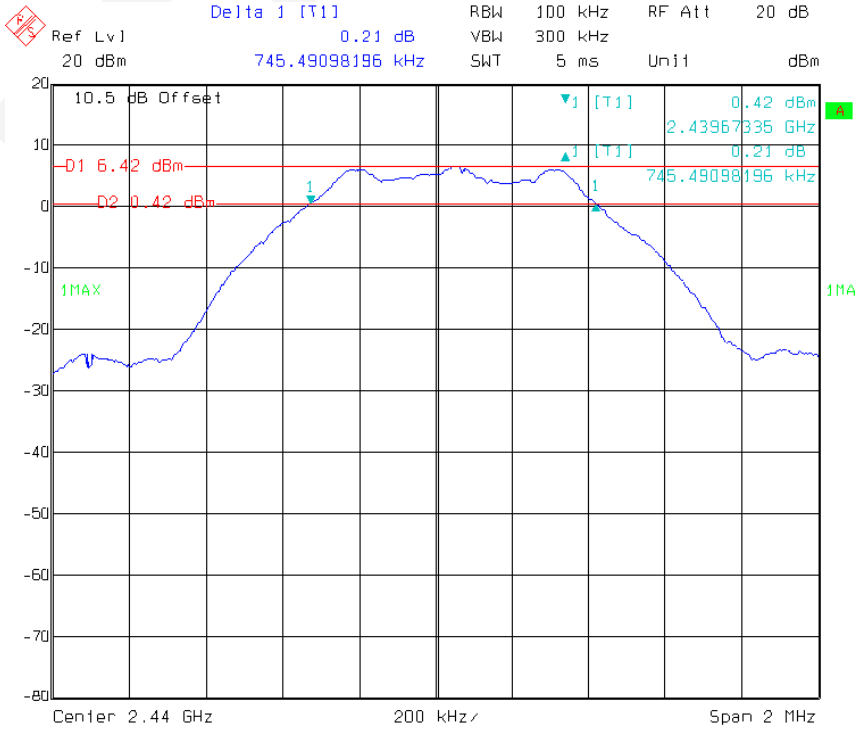
Wi-Fi mode, 802.11n-HT40 High Channel



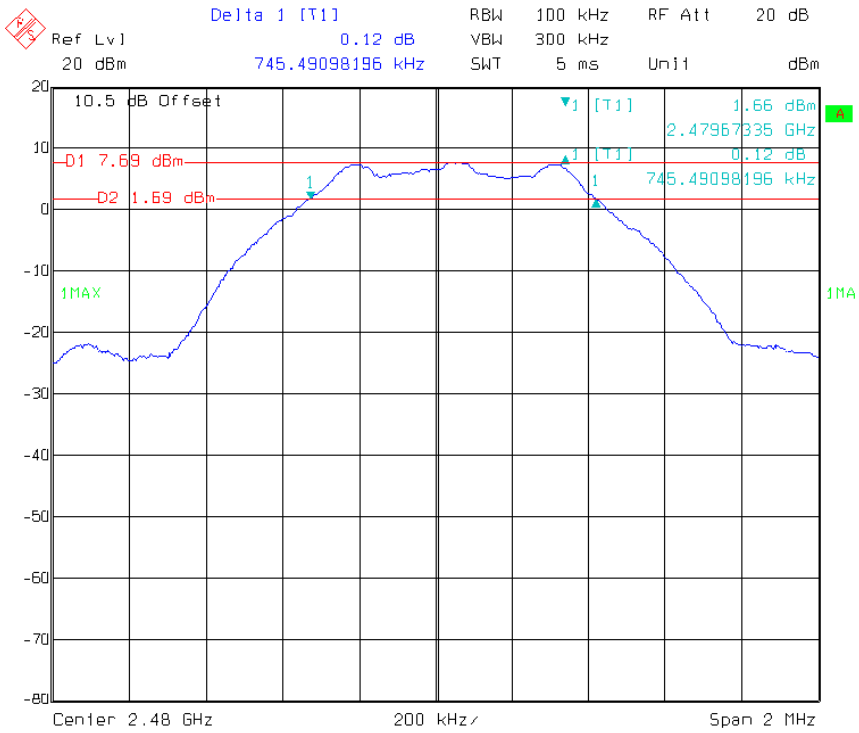
LE 1M mode, Low Channel



LE 1M mode, Middle Channel



LE 1M mode, High Channel



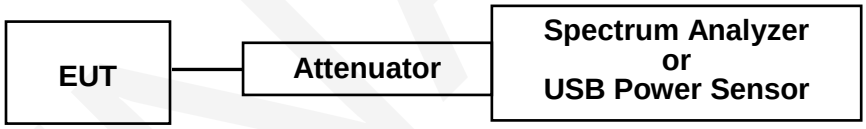
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	19 °C
Relative Humidity:	60 %
ATM Pressure:	96.1 kPa

The testing was performed by Tian Maofan on 2020-03-11.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table.

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	15.61	12.25	30
	Middle	2437	15.68	12.30	30
	High	2462	15.59	12.24	30
802.11g	Low	2412	14.83	6.36	30
	Middle	2437	14.91	6.48	30
	High	2462	14.88	6.43	30
802.11n-HT20	Low	2412	14.87	6.38	30
	Middle	2437	14.96	6.51	30
	High	2462	14.85	6.43	30
802.11n-HT40	Low	2422	14.31	5.90	30
	Middle	2437	14.36	5.97	30
	High	2452	14.37	5.99	30
LE 1M	Low	2402	5.87	/	30
	Middle	2440	6.70	/	30
	High	2480	7.90	/	30

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

Temperature:	19 °C
Relative Humidity:	60 %
ATM Pressure:	96.1 kPa

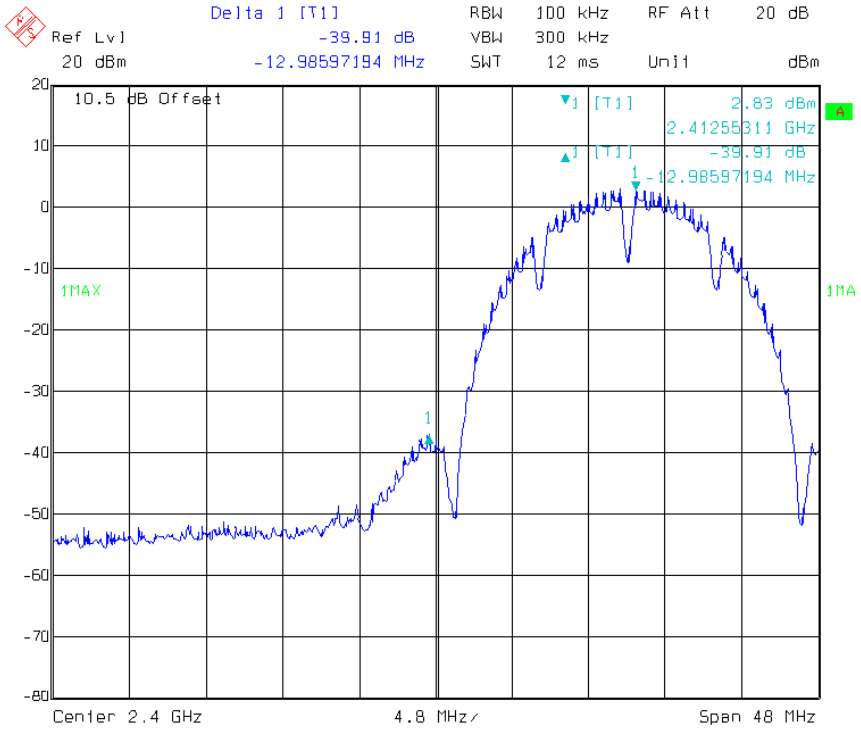
The testing was performed by Tian Maofan on 2020-03-11.

Test mode: Transmitting

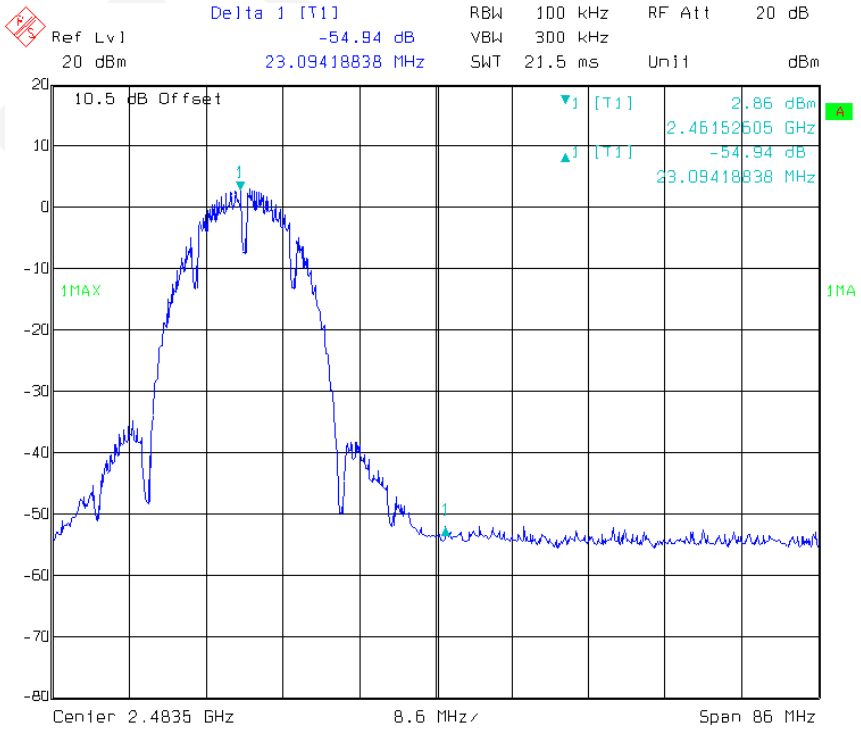
Test Result: Compliance. Please refer to following plots.

Wi-Fi mode

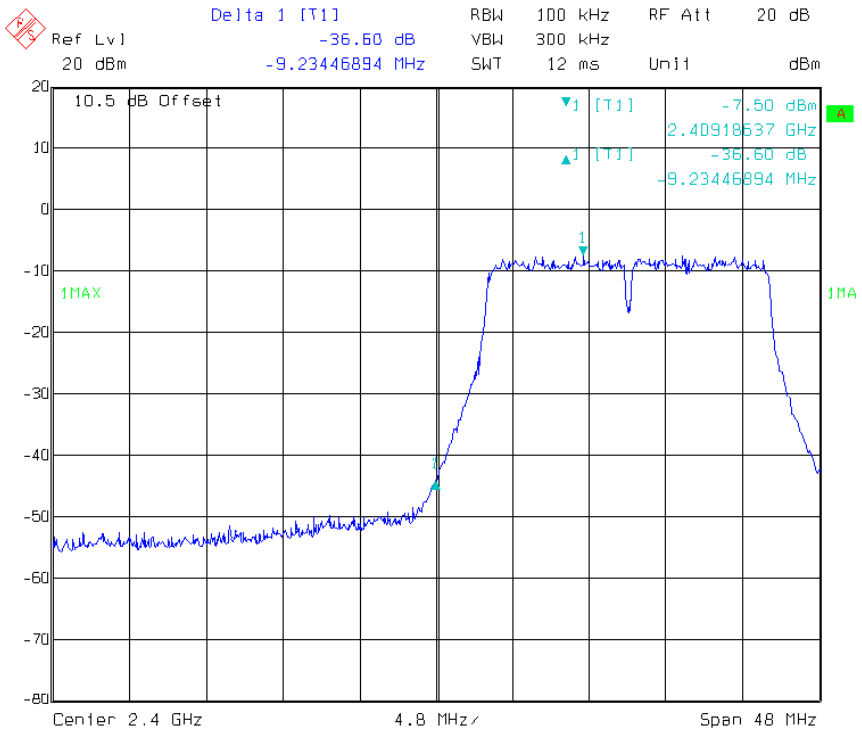
802.11b: Band Edge, Left Side



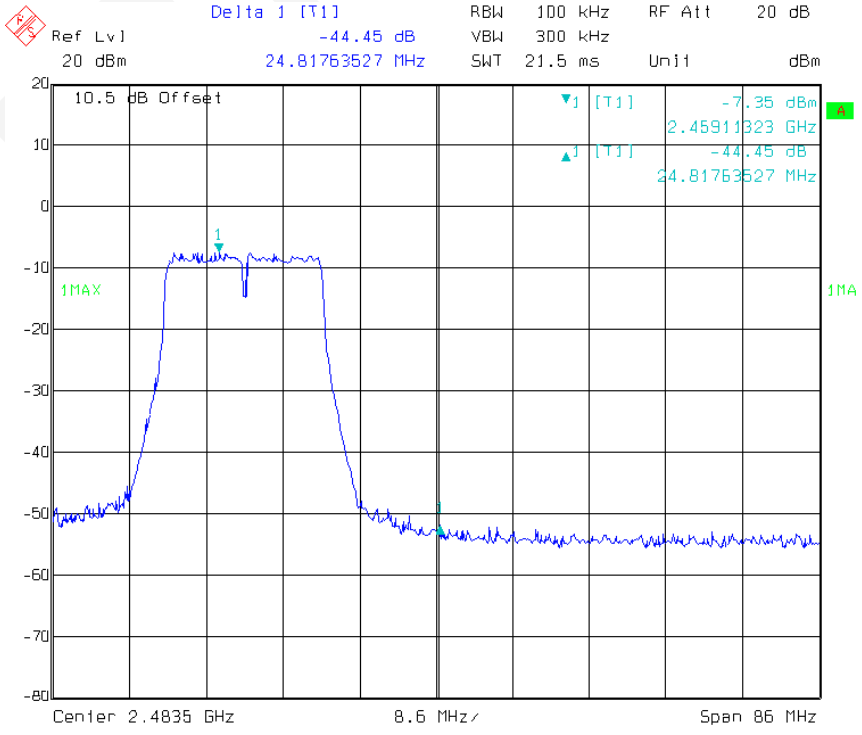
802.11b: Band Edge, Right Side



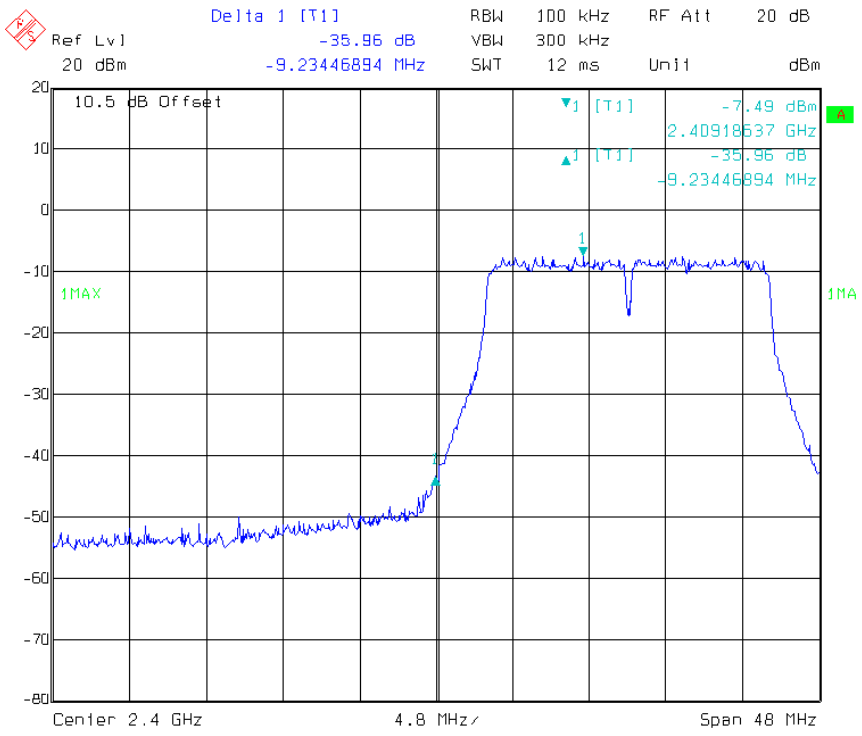
802.11g: Band Edge, Left Side



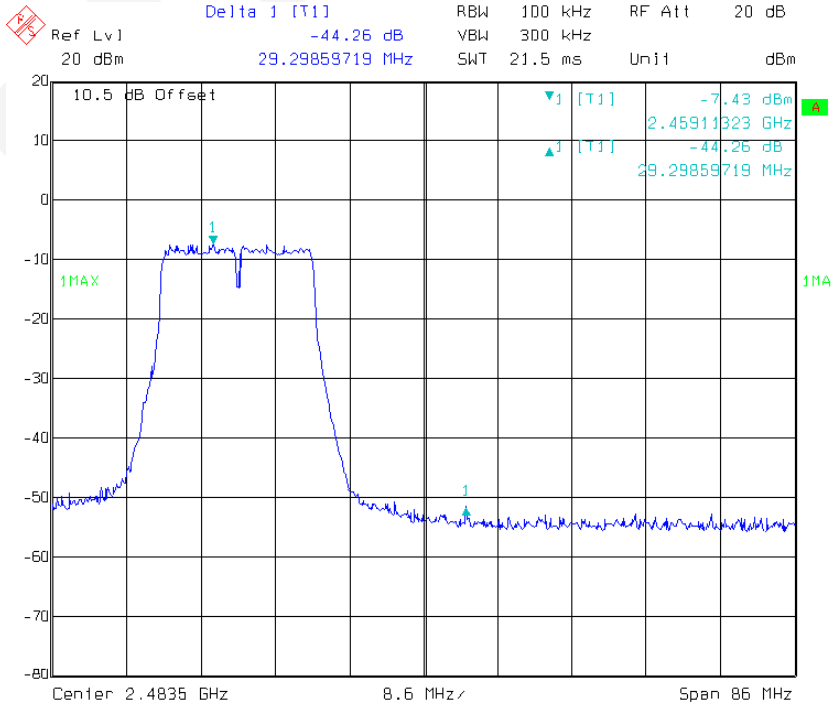
802.11g: Band Edge, Right Side



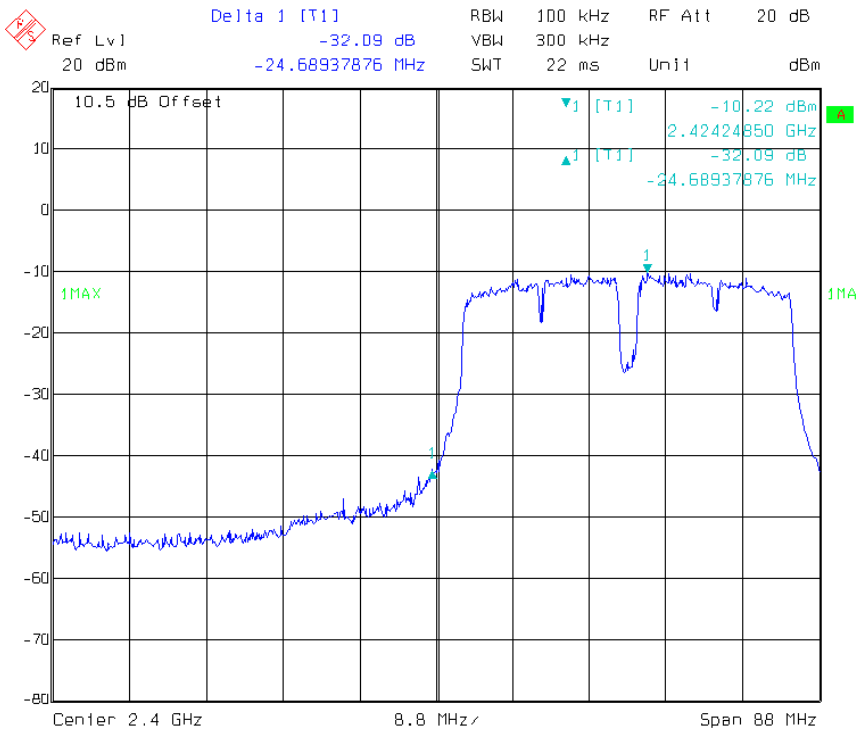
802.11n-HT20 Band Edge, Left Side



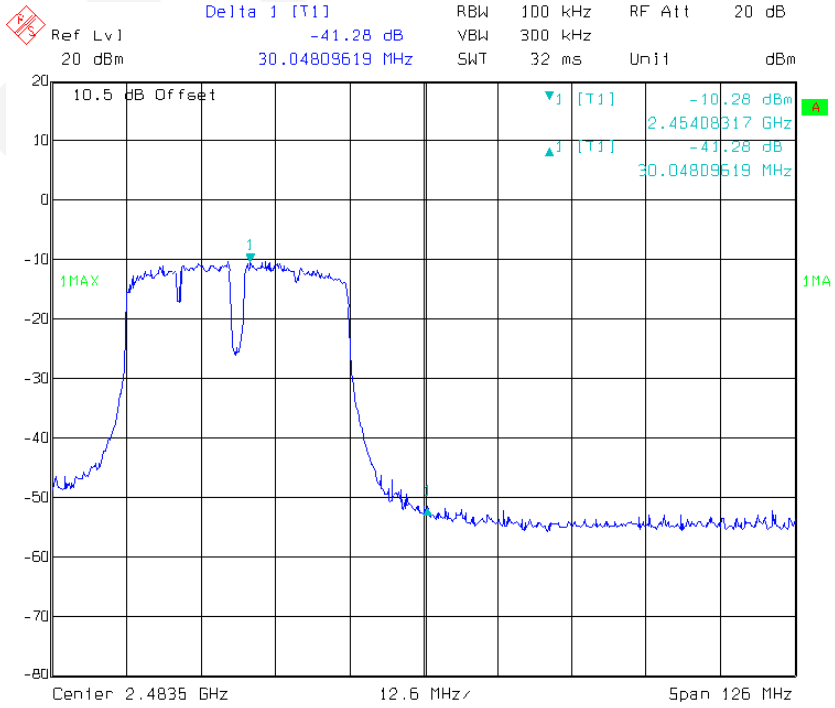
802.11n-HT20 Band Edge, Right Side



802.11n-HT40 Band Edge, Left Side

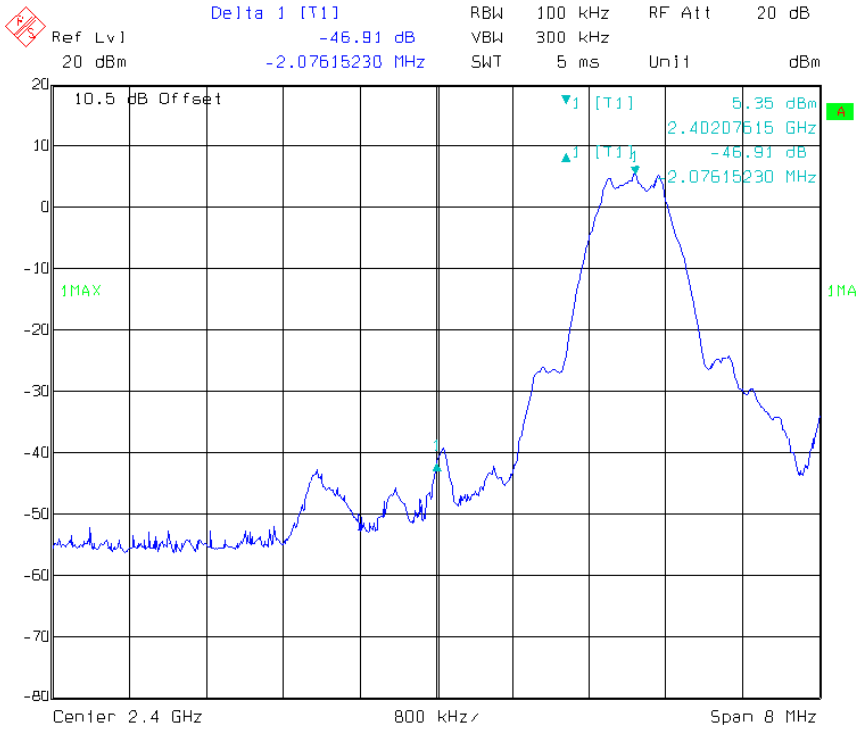


802.11n-HT40 Band Edge, Right Side

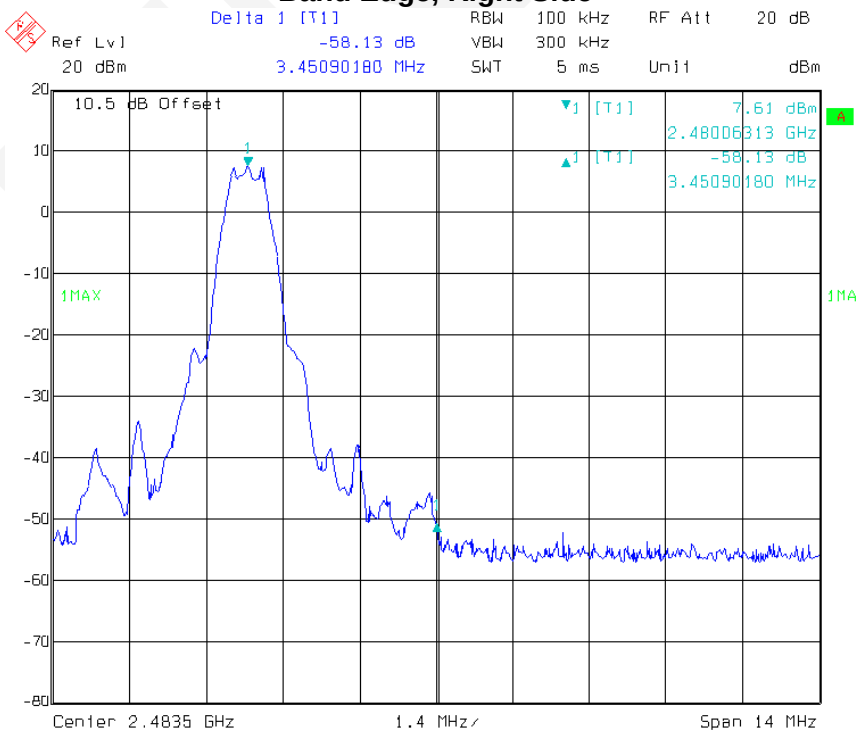


LE 1M mode

Band Edge, Left Side



Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	19 °C
Relative Humidity:	60 %
ATM Pressure:	96.1 kPa

The testing was performed by Tian Maofan on 2020-03-11.

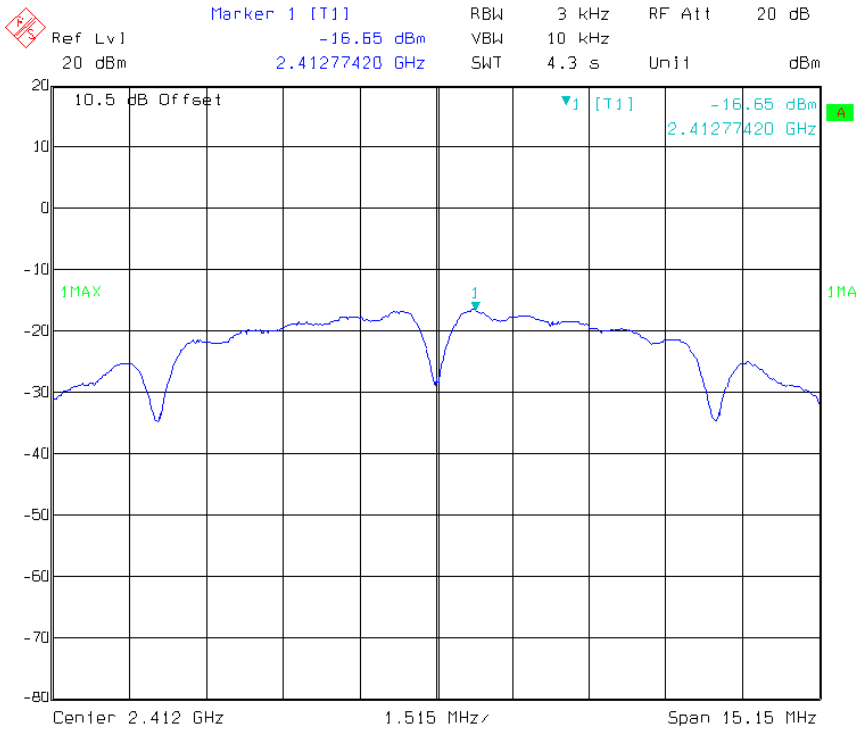
Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots

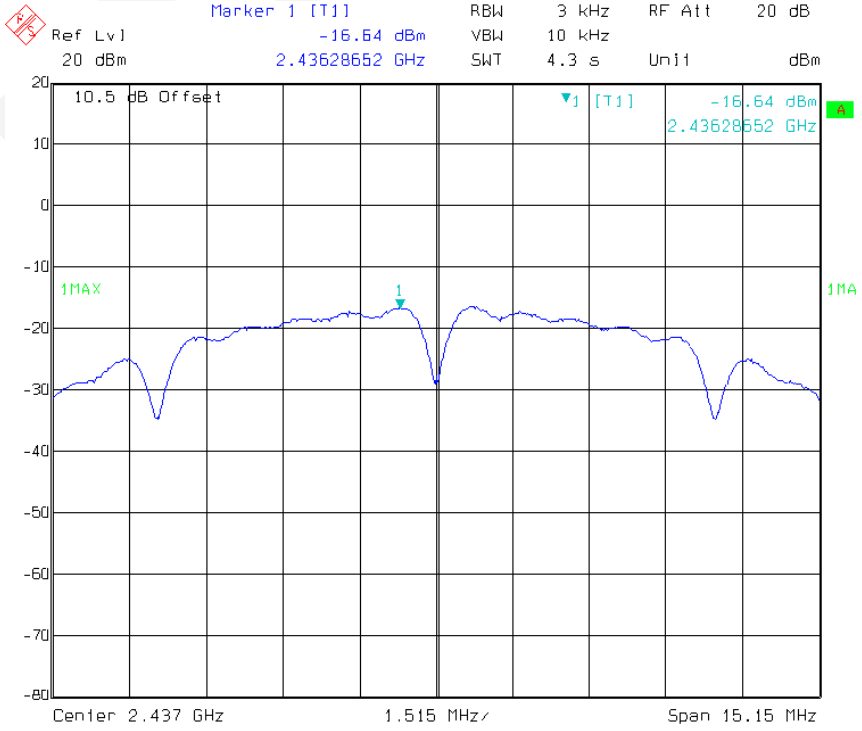
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-16.65	≤8
	Middle	2437	-16.64	≤8
	High	2462	-16.76	≤8
802.11g	Low	2412	-21.35	≤8
	Middle	2437	-21.18	≤8
	High	2462	-21.31	≤8
802.11n-HT20	Low	2412	-21.30	≤8
	Middle	2437	-21.25	≤8
	High	2462	-21.25	≤8
802.11n-HT40	Low	2422	-24.09	≤8
	Middle	2437	-24.17	≤8
	High	2452	-24.09	≤8
LE 1M	Low	2402	-9.79	≤8
	Middle	2440	-8.76	≤8
	High	2480	-7.53	≤8

Wi-Fi mode

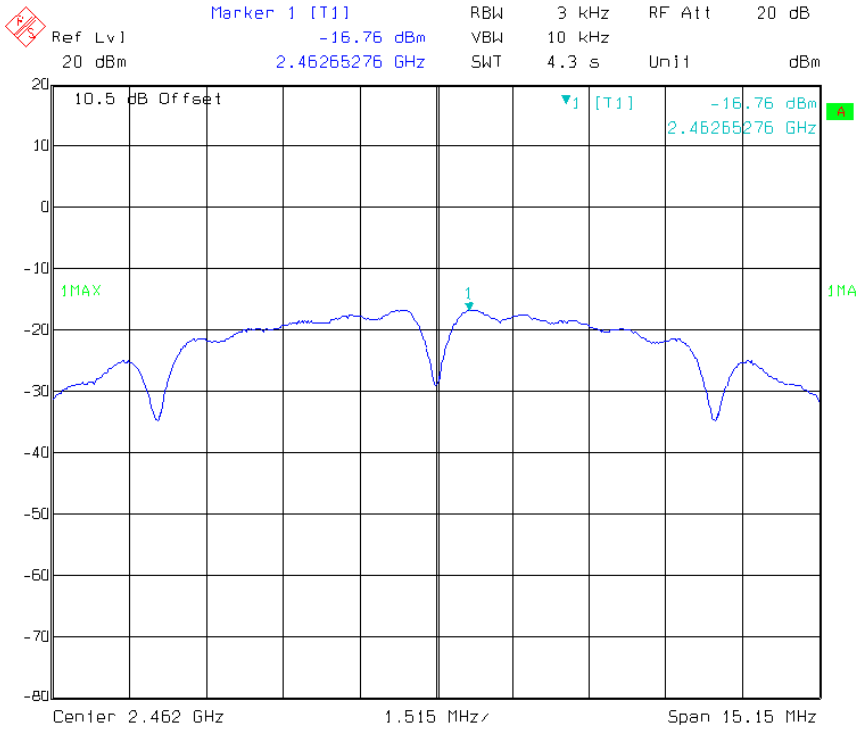
Power Spectral Density, 802.11b Low Channel



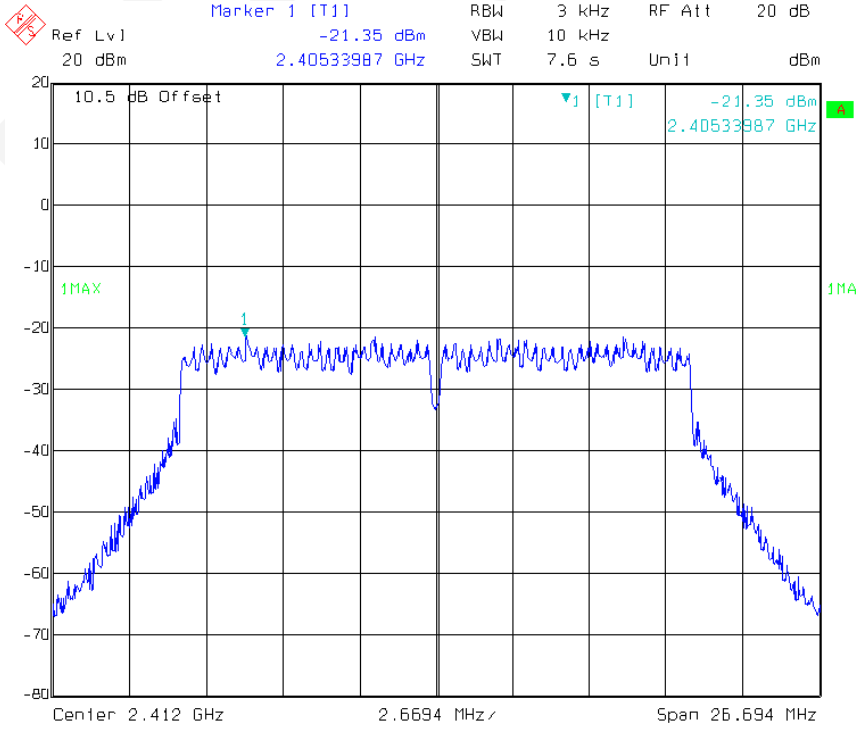
Power Spectral Density, 802.11b Middle Channel



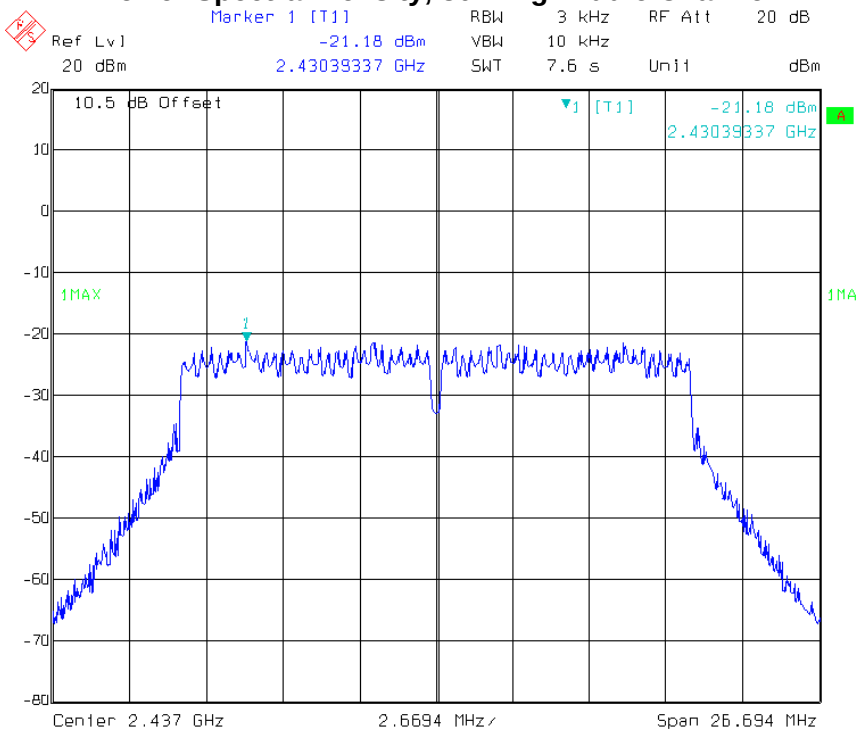
Power Spectral Density, 802.11b High Channel



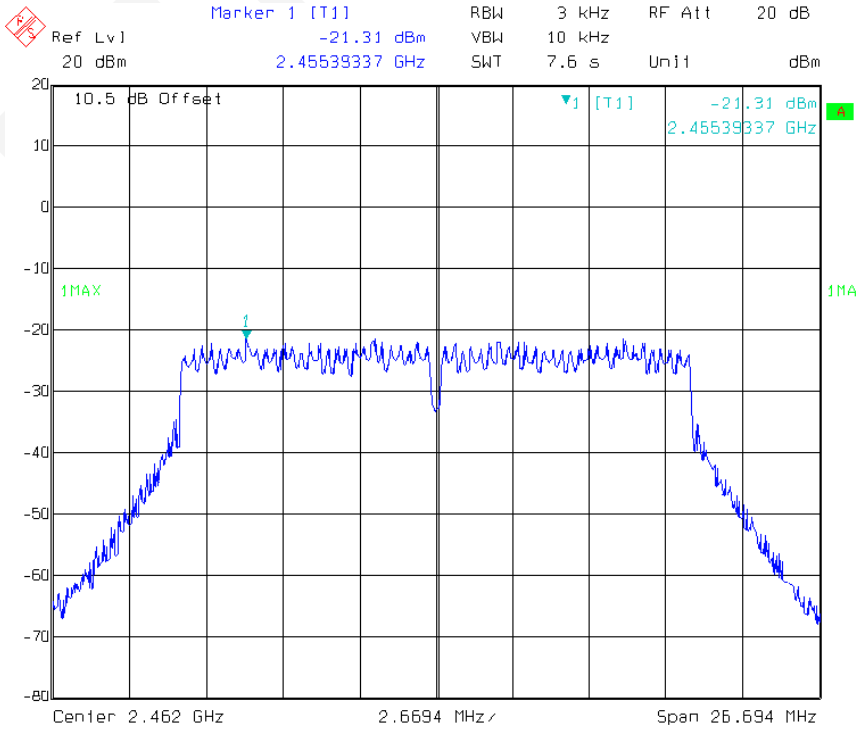
Power Spectral Density, 802.11g Low Channel



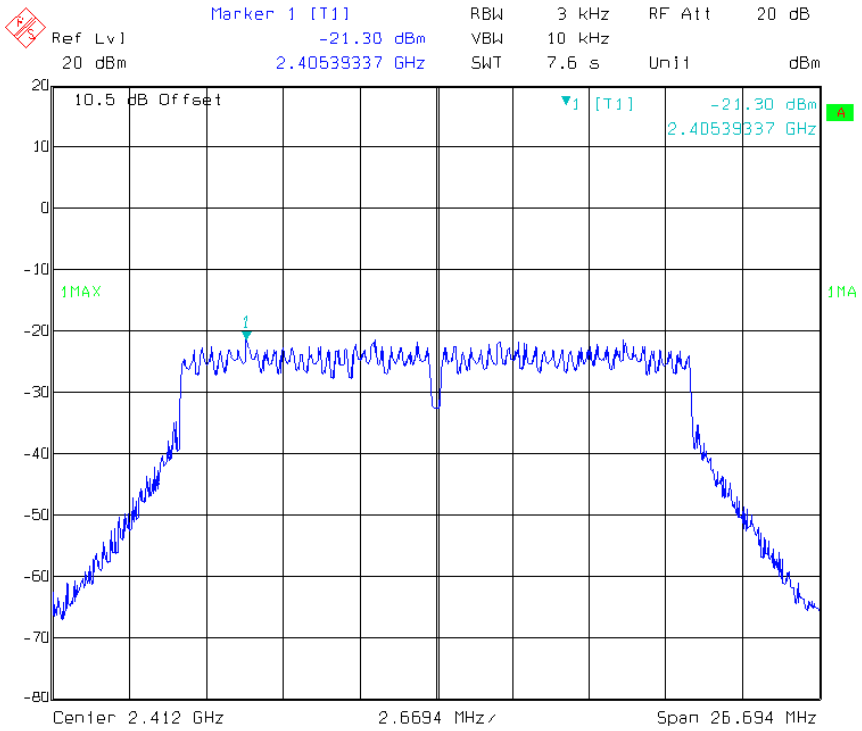
Power Spectral Density, 802.11g Middle Channel



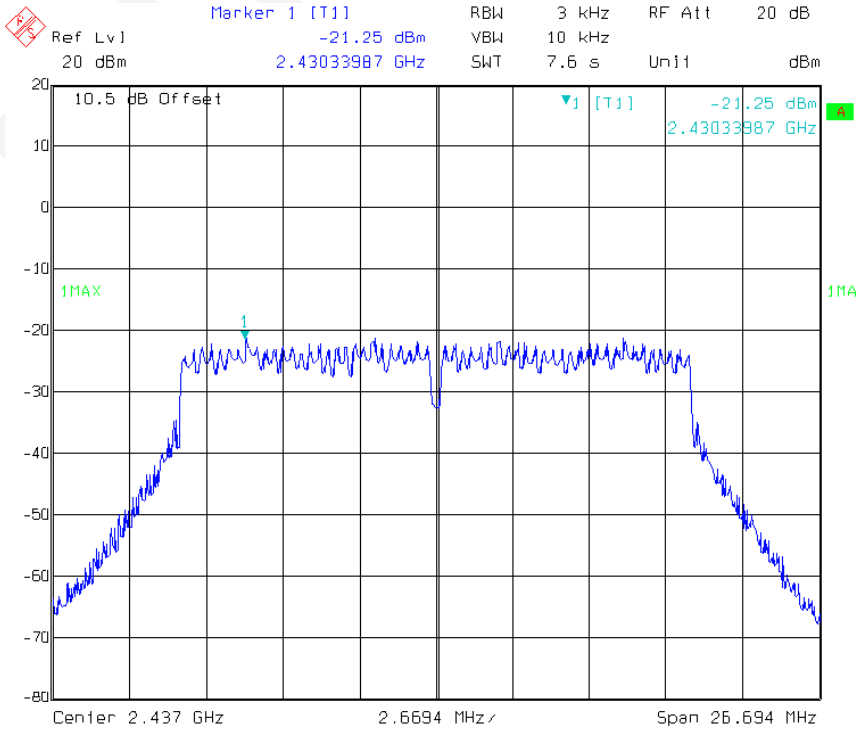
Power Spectral Density, 802.11g High Channel



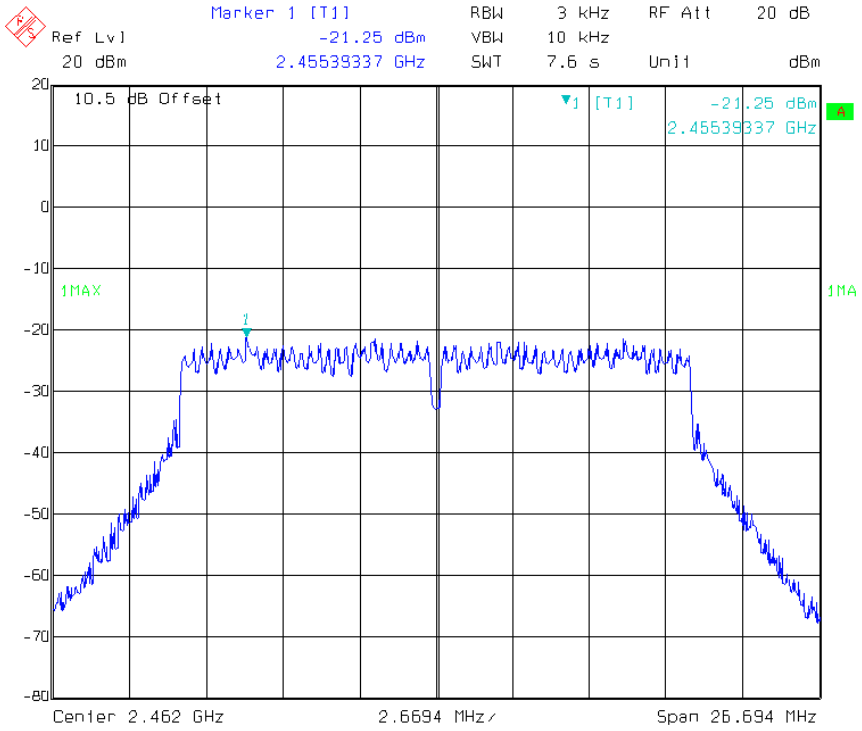
Power Spectral Density, 802.11n-HT20 Low Channel



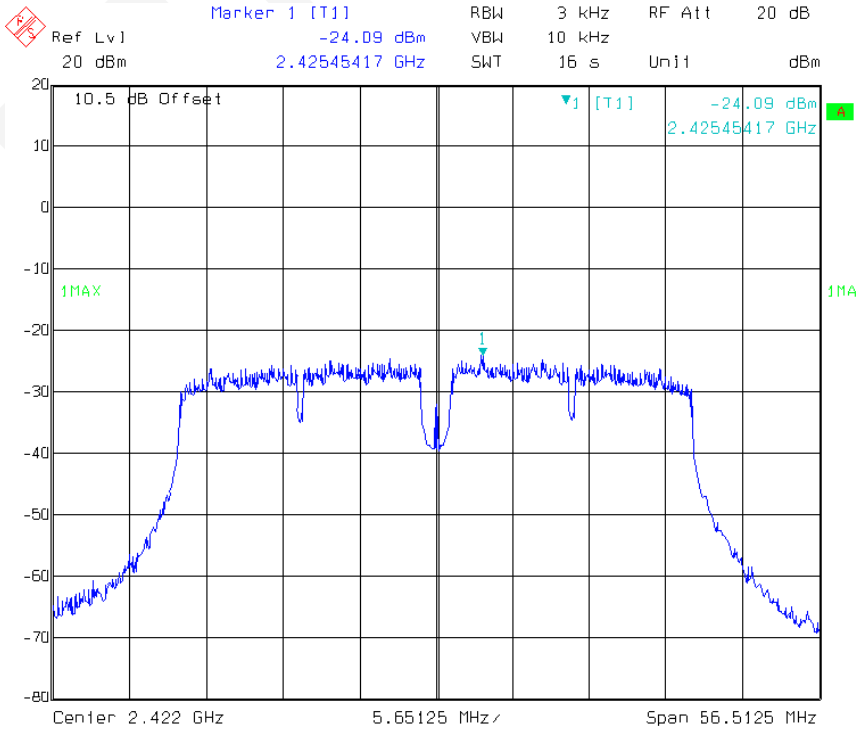
Power Spectral Density, 802.11n-HT20 Middle Channel



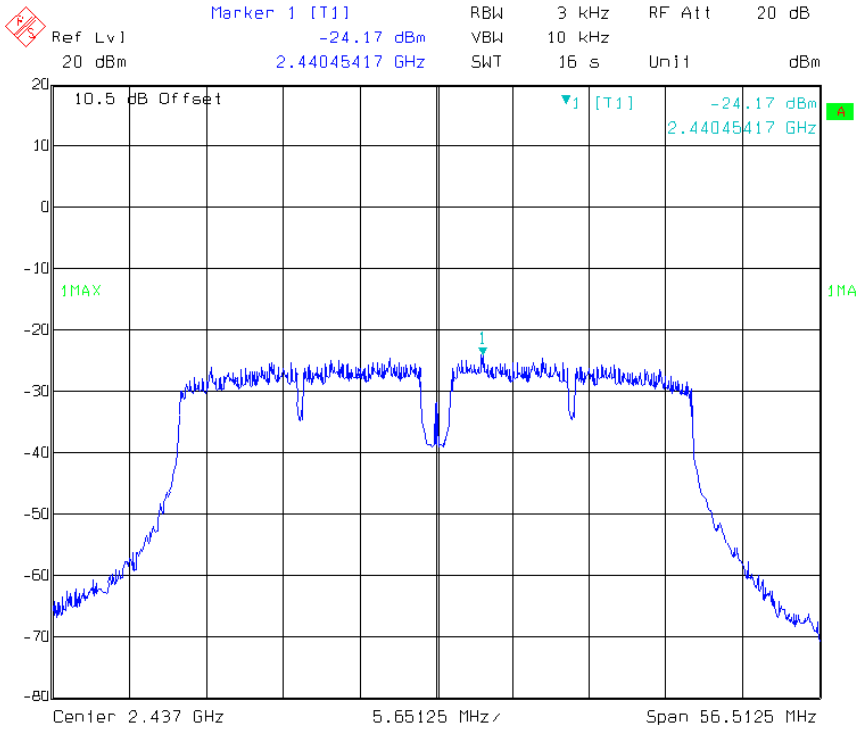
Power Spectral Density, 802.11n-HT20 High Channel



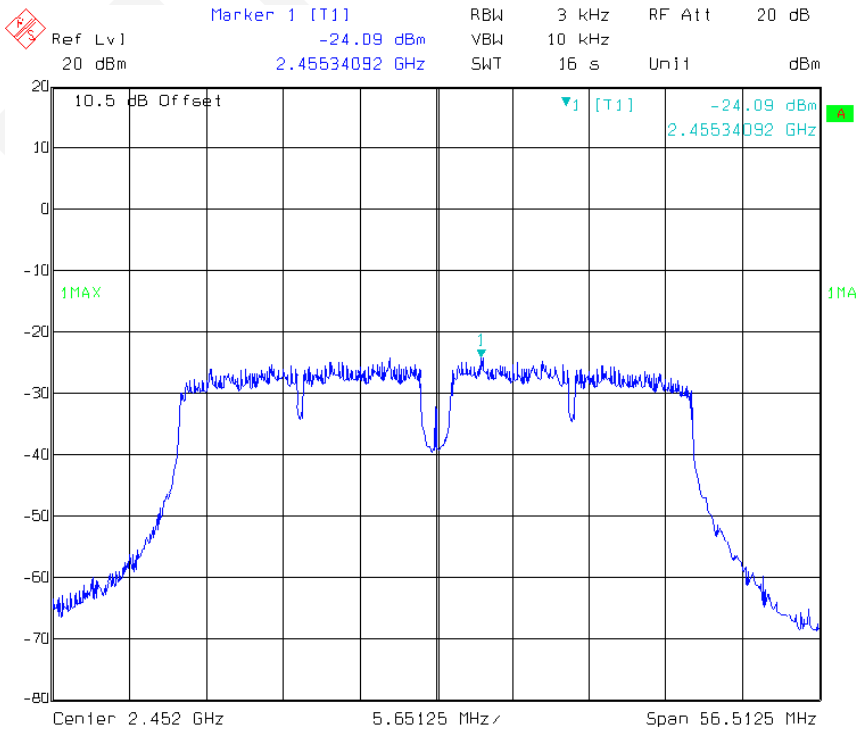
Power Spectral Density, 802.11n-HT40 Low Channel



Power Spectral Density, 802.11n-HT40 Middle Channel

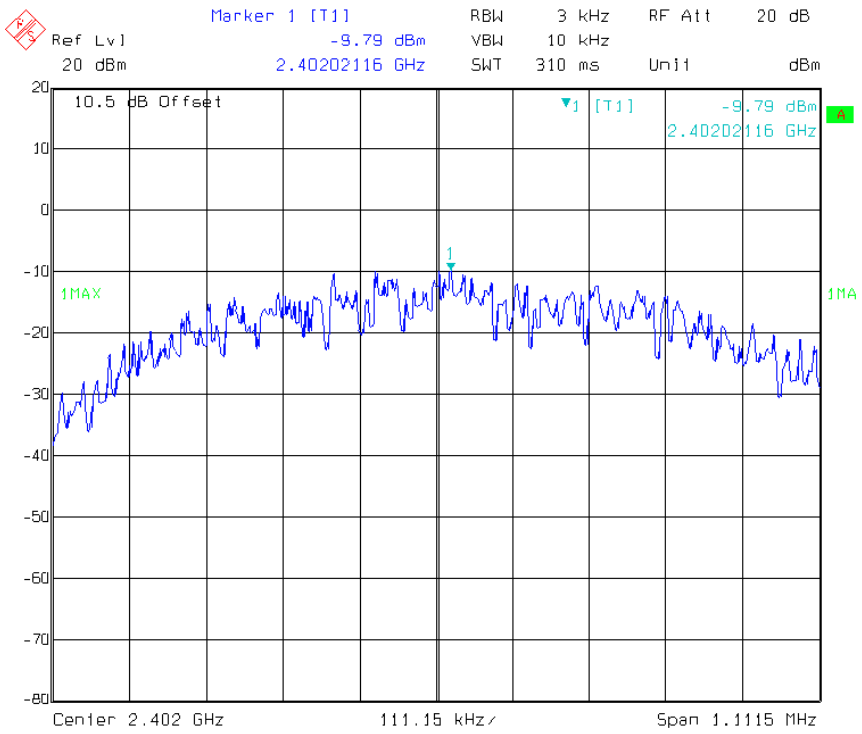


Power Spectral Density, 802.11n-HT40 High Channel

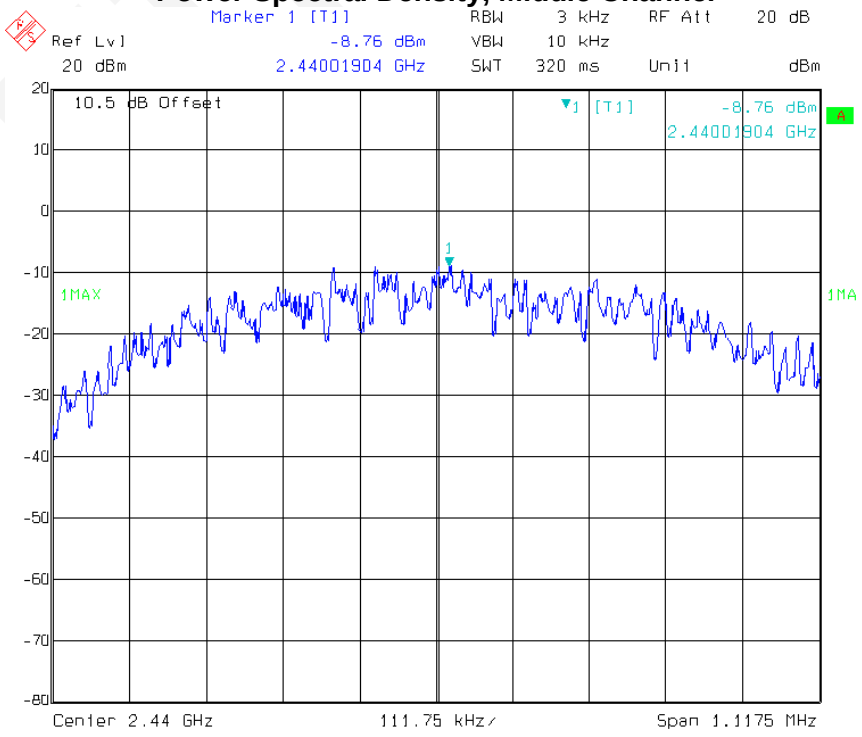


LE 1M mode

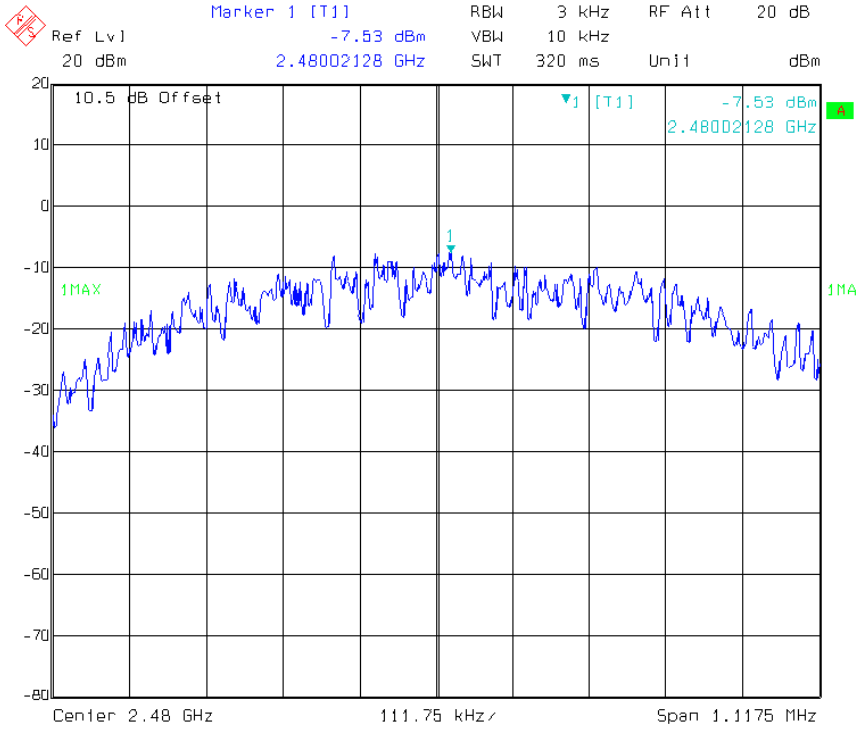
Power Spectral Density, Low Channel



Power Spectral Density, Middle Channel



Power Spectral Density, High Channel



END OF REPORT